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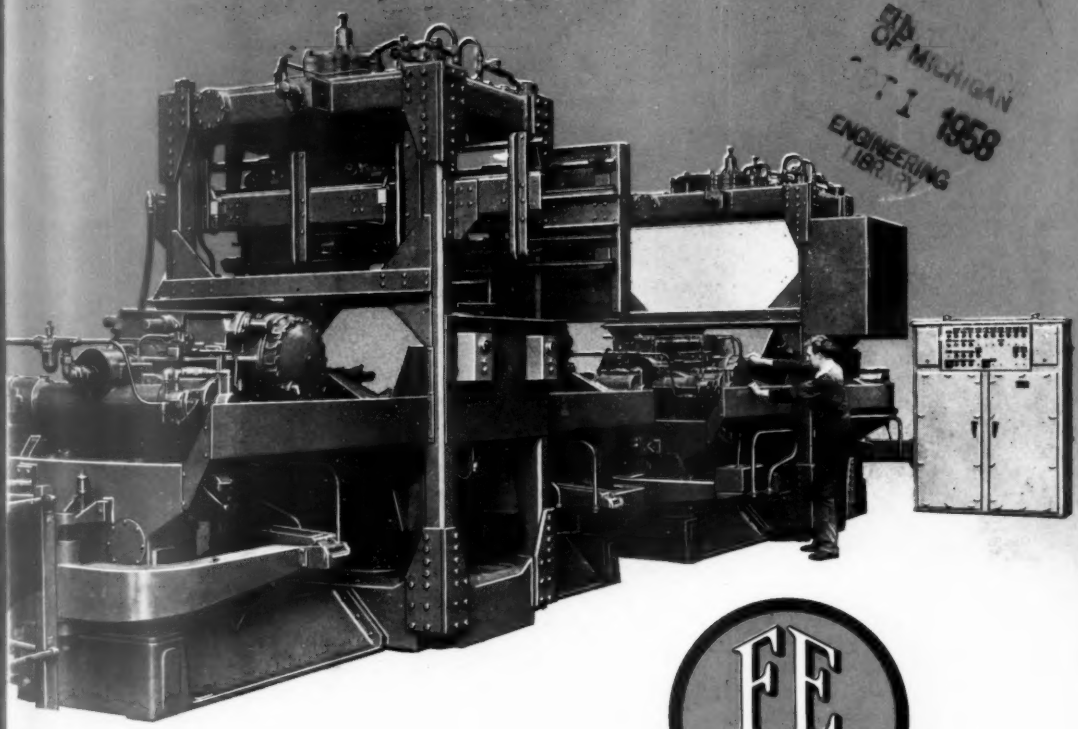

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PRINCIPAL CONTENTS

Page

Improvement of Cast Iron by Oxygen Blowing
By Dr. Ichiro Iitaka and Kokichi Nakamura

Account of experiments and results obtained in an attempt to use oxygen injection as a substitute for steel scrap when making iron for casting purposes from remelted pig-iron 313

Survey of Belgian Foundries III: S. A. Cockerill-Ougrée

A first-hand report of the Cockerill organization and principal foundry features 317

American Foundrymen's 62nd Castings Conference

Further papers from the Cleveland Congress 323

Foundries in the Hawker Siddeley Group

Details of the wide-ranging foundry associations of the group in the United Kingdom and Canada 325

Amélioration de la Fonte par Insufflation d'Oxygène.
Par Dr. Ichiro Iitaka et Kokichi Nakamura.
Compte-rendu des expériences et résultats obtenus de la tentative d'utilisation d'insufflation d'oxygène en remplacement de déchets d'acier pendant la production de fonte pour moulages en fer, utilisant des gueuses de fonte refondues. 313

Visite aux Fonderies Belges. (III): S. A. Cockerill.
Rapport récent sur l'organisation des usines Cockerill et les principales caractéristiques de leur fonderie. 317

62 éme Conférence sur les Coulées de la Société americaine des Fondeurs.
De nouveaux mémoires du Congrès de Cleveland. 323

Fonderies dans le groupe Hawker-Siddeley.
Des détails sur les larges associations de fonderies en Grande Bretagne et au Canada. 325

Verbesserung von Gusseisen durch Einblasen von Sauerstoff.
Von Dr. Ichiro Iitaka und Kokichi Nakamura.
Bericht über Experimente und erzielte Ergebnisse bei einem Versuch Sauerstoff einzublasen anstatt Stahlschrott zur Gattierung zuzusetzen, um Umschmelzeisen wider für Gusszwecke verwendbar zu machen 313

Besichtigung belgischer Giessereien. (III): S. A. Cockerill
Eigenbericht über die Cockerill-Organisation und die wichtigsten Merkmale ihrer Giesserei 317

Gusstagung der amerikanischen Giessereifachleute.
Weitere auf dem Cleveland Kongress gehaltene Vorträge 323

Giessereien in der Hawker-Siddeley-gruppe.
Einzelheiten der weitverzweigten Giessereibeziehungen dieses Konzerns in Grossbritannien und Kanada. 325

Features, News, Commercial Information and Statistics

Leader: Problems of the Small Manufacturer 309
Featuring: Sir Roy H. Dobson, C.B.E., Hon.F.R.Ae.S., J.P. 311
Plant Engineers' Refresher Course 312
Cupola-man's Mobile Bench 315
American Foundry Research Laboratory 316
Equipment and Supplies 322
Notes from the Branches 327
Company News 330
News in Brief 331
Fuel Efficiency Exhibition 332
Personal 333
Raw Material Markets 334
Current Prices of Iron, Steel and Non-Ferrous Metals 336
Forthcoming Events 337
Contracts Open 337
Imports and Exports of Iron and Steel 338

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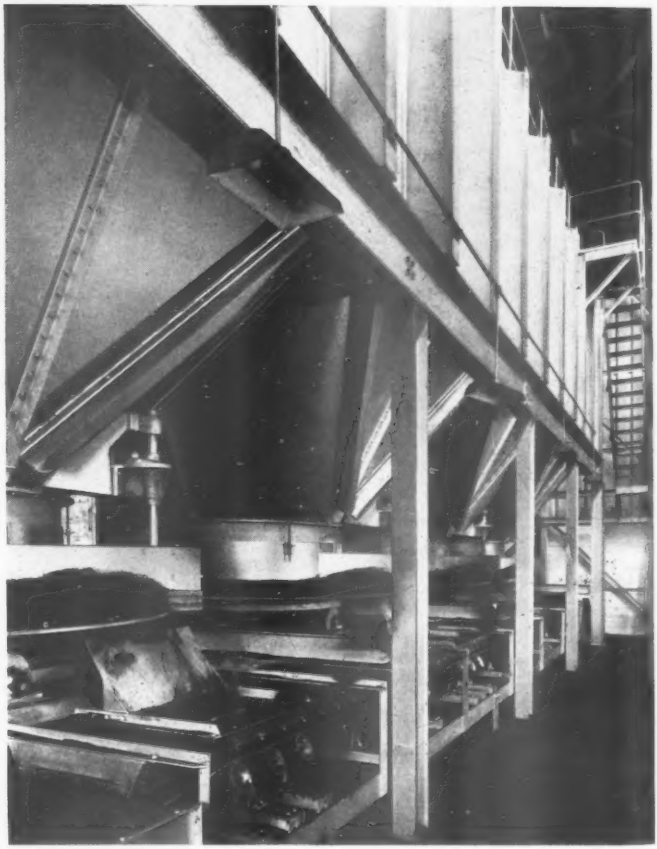

Photograph shows :
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FOUNDRY
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Problems of the Small Manufacturer

Quite a few lecturers have recently been devoting attention to the small manufacturer and his problems, the most important of which would appear to be the difficulties he encounters in being able to acquire and apply the latest techniques. One suggested remedy is that he should employ a high-grade—and necessarily a highly-paid—executive. This would enable the owner of the business to delegate much of the day-to-day routine and enable him to devote more of his time to the wider subjects of management and development. The owner of the small-to-medium-size foundry is well aware of the potentialities to be gained from such a step, but strange as it may seem, such men are cost conscious and in two cases to our personal knowledge, have set for themselves a quite high annual-turnover figure below which they would hesitate to engage a high-grade technologist. They insist that a second-rater would be useless, and prefer to rely on the services of a test house or local technical college for periodic analyses and other control media.

Another point raised in these lectures is that the small manufacturer is, in general, ignorant of sources of technical information. Candidly, we do not think this applies to the modest foundry owner. That he knows very well where to go for information is amply demonstrated by our morning mail, which so often carries requests for sources of supply of material, equipment, etc., whilst the figures for queries received by foundry research organizations are impressive in number. What is more, the quality of the replies received from such organizations has been vouched for in one of the reports issued on this very subject, the British Cast Iron Research Association coming in for special commendation. Perhaps a few founders do sometimes fail, however, to remember also the services freely given by the development departments associated with aluminium, tin, copper, lead and nickel industries, in the files of which a wealth of reliable technical data is contained.

The general impression one gets from these reports and lectures directed to the owner of the small factory is that he is overworked and under-remunerated. He does, however, value his independence, and some businesses started since the war by individuals, brothers or close associates have developed into concerns of considerable importance, and are still expanding. These at least have overcome the problem of finance, which is usually stressed as being a major difficulty. Lecturers have put forward the importance of work-study, but obviously in a small jobbing shop, this would be limited in its scope to that of general organization, though even here, much can be done. Even without the aid of a consultant, self-questioning as to how, where and why and by whom each job should be done, will go far to converting the chaotic into an orderly well-organized shop.

SIR ROY H. DOBSON, C.B.E., Hon. F.R.Ae.S., J.P.

Featuring . . . .

SIR ROY H. DOBSON, C.B.E., Hon. F.R.Ae.S., J.P.

SIR ROY DOBSON, now managing director of the Hawker Siddeley group of companies, was born at Horsforth, Yorkshire, in 1891. He served his apprenticeship with T. & R. Lees of Hollinwood, Manchester, and joined the engineering staff of A. V. Roe & Company, Limited, in 1914. In 1919 he became works manager; in 1934 general manager and in 1936 was appointed to the board. In 1941 he became managing director of A. V. Roe and received the C.B.E. in 1942. Elected to the board of the Hawker Siddeley Group in 1944, he received his Knighthood in 1945.

It was in 1945 that Sir Roy played the major part in founding A. V. Roe Canada, Limited, which has now grown to rival the UK activities of the Hawker Siddeley Group in size. Sir Roy was first president of A. V. Roe Canada and is now its chairman. Sir Roy was also the prime mover in bringing the Brush Group into the Hawker Siddeley orbit last year and he is now deputy chairman of the Brush Group, Limited.

In addition to other industrial appointments, Sir Roy is chairman of the Hawker Siddeley Nuclear Power Company, Limited, Hawker Siddeley John Brown Nuclear Construction, Limited, and (in Canada) of the Dominion Steel & Coal Corporation, Limited, Avro Industries, Limited, and Racair, Limited. He is also a director of High Duty Alloys, Limited, Canadian Car Company, Limited, and of the Canadian Bank of Commerce.

During 1940/41 he was president of Manchester Engineering Employers' Association and early in the war became first chairman of the Air Defence Cadet Corps of the Manchester Wing. Later he was first chairman of the 23 squadrons of that Wing of the Air Training Corps, becoming later their commanding officer, with the rank of Wing Commander. During 1948/49, Sir Roy was president of the Society of British Aircraft Constructors; he was also Hon. Air Commodore of No. 613 (City of Manchester) Squadron RAFVR and No. 3613 Fighter Control Unit.

Sir Roy is a Justice of the Peace for Ashton-under-Lyne, a Freemason and past master of the Albatross Lodge; he also holds aviation certificate No. 8068 and pilot's "A" licence.

A summary of the foundry operations of companies in the Hawker Siddeley Group and associated groups is printed on page 325 of this issue.

Davy & United to Moderate Development Programme

Dealing with prospects and development for Davy & United Engineering Company, Limited, the chairman, Mr. D. F. Campbell, in his annual review states that perhaps the most disturbing feature is the fact that the British steel industry "has again become a political football." The uncertainty thus created was rendering difficult the raising of finance for large new steel developments.

The growth of steel capacity would be somewhat slower than was anticipated a year ago, there was also some uncertainty in export markets and a growing demand for long-term credit. Taking all these factors together the directors had decided to moderate the further development programme originally proposed. The current £3,000,000 development programme would be coming progressively into operation during the next few months.

It is also announced that the company is raising some £950,000 by a one-for-three rights issue of 377,382 £1 shares at 50s. each to stockholders registered on August 20. The issue has been underwritten by the Industrial Finance & Investment Corporation. The proceeds will provide the balance of funds required for the development plan now nearing completion and part of the funds required for the £1,000,000 further expansion programme. The board anticipates that the balance of funds needed for this further expansion can be found from the company's own resources.

There has been so much ill-informed comment on industrial profits in recent years, Mr. Campbell states, that it was important that the company's profit earned —a record by a substantial margin—should be viewed in proper perspective. The company's policy was to increase the return on capital employed, not by increasing the margin of profit included in its prices, but by shipping more goods through its factory doors in any year *per capita* of employment. That was what, in the main, accounted for the very considerable increase in profits.

It arose from greater output; from better profits from the Middlesbrough foundry, and from the inclusion of a useful contribution from the recently-formed instrument division. All this had been achieved by reinvesting a substantial part of earnings in the installation of the most modern plant and equipment. The year's result was the first real reward after many difficulties and disappointments and was the culmination of 10 years' hard work.

Group profits in 1957-58 of £1,310,422 compared with £641,642 for the previous year and the dividend is raised from 15 per cent. to 20 per cent. The present order-book and the rate of production gives "sound hopes" for believing that the results during the next two years should be satisfactory.

Change of Address

Midland Monolithic Furnace Lining Company, Limited, announce a change of address to Goose Lane, Barwell, Leicestershire (tel. Earl Shilton 2061/2 (2 lines)). It is stated that the increase of the firm's business in special refractories and the wider range covered has necessitated larger premises and the opportunity has been taken of acquiring sufficient space both for manufacturing and for office accommodation. The production of ganisters, ground clays, etc., will be continued at the quarry but all administration and sales will be transferred to the new address. All correspondence should therefore be sent to Barwell.

Plant Engineers' Refresher Course

The education committee of Incorporated Plant Engineers announce that the next of their comprehensive refresher courses for senior works and plant engineers is to be held this winter at Liverpool University. It will comprise 18 weekly lectures on Thursday evenings and is to be opened on October 30 by Sir Oliver Lyle, O.B.E., F.INST.F., HON.M.I.PLANT E., joint managing director, Tate & Lyle, Limited, who has taken a prominent part in these courses since their inception.

The syllabus covers: The planning and control of maintenance; cost consciousness and the engineer; the application of new materials to plant engineering; properties and treatment of metals and alloys; developments in welding practice; lubrication; combustion; oil-firing; steam utilization; space heating; thermal insulation of industrial buildings; factory electrical systems; current techniques and future trends in the planning of plants and the operation of processes; materials handling; industrial accident prevention; communications and human relations; and the impact of automation on the plant engineer.

Designed to encourage the most effective use of existing knowledge and to promote the application of up-to-date techniques in works-engineering practice over a broad field, its purpose is to help works and plant engineers to make the fullest possible contribution to increasing productivity.

The fee for the course is four guineas and copies of the syllabus and full particulars may be obtained from the secretary (for the refresher course), at the Donnan Laboratory, Vine Street, Liverpool 3.

Latest Foundry Statistics

Light Alloys.—In June, 140 tons of magnesium castings were produced according to the Ministry of Supply. A recent note in the American Press said that the production of castings in this metal had overtaken the wrought products. The figures for the first six months of this year show that whilst 995 tons of castings were made, the wrought materials totalled 312 tons. The production of aluminium castings was 1,574 tons in sand cast material; 3,840 as gravity-die and 1,460 tons as pressure-die-castings.

Steel Castings.—The joint *Bulletin* issued by the Iron and Steel Board and the British Iron and Steel Federation for July gives the average weekly production of steel castings as 4,400 tons. This is the lowest figure recorded for many years. It compares with 5,800 tons in June and 5,500 tons in July, 1957. All these are provisional figures. As would be expected, employment has decreased. On July 5 it stood at 19,460, which is lower by 350 than the figure of 19,810 reported for June 7.

Electric Steel Makers' Guild

The Electric Steel Makers' Guild was formed last year to promote progress in the manufacture of steel for commercial purposes in electric melting furnaces, and to encourage free discussion and exchange of information of mutual interest to members. Membership is limited to executives who are regularly employed directly in the manufacture of electric-furnace steel for commercial use, and, meetings are held three times each year. These are quite informal and no records of technical discussions are made or published. The officers of the Guild for the current year are: *President*, Mr. Frank T. Bagnall, Samuel Fox & Company, Limited; *vice-president*, Mr. Arnold Mettam, English Steel Corporation, Limited; and *secretary-treasurer*, Mr. W. H. Everard, Edgar Allen & Company, Limited.

Improvement of Cast Iron by Oxygen Blowing*

By Dr. Ichiro Iitaka and Kokichi Nakamura †

Laboratory trials and the results obtained from them are reported in an attempt to use oxygen injection as a substitute for steel scrap to lower silicon and carbon contents when making iron for casting purposes from remelted pig-iron. In each case, the initial temperature of the metal, the quantity of oxygen and the resulting silicon carbon and tensile strength are related. The effect of inoculants was also investigated. Quite high tensile strengths resulted and the importance is made clear of suppressing the tendency for white iron to be formed.

In an earlier paper[1] the Authors dealt with a number of fundamental problems relating to the strength of cast iron, showing its increase with decreasing C and Si. Steel scrap is commonly used for lowering the C and Si contents of iron, but the Authors have preferred to have recourse to converter operation in conjunction with the oxygen blow. The effect of blowing temperature was examined to find the optimum temperature and the effect of an inoculant for preventing the iron from becoming white after the application of oxygen was also examined.

Experimental Procedure

Three hundred and fifty gm. of "Honkeiko" pig-iron was melted in a Tammann furnace and oxygen from a gas cylinder was blown into the molten iron at a rate of 1 to 2 litres per min. using a silica tube, the flow being controlled by a Rotameter.

Tensile tests were carried out on test-pieces cast in a dry-sand mould to a size of 20-mm. dia. by 150-mm. long and these were machined to 12-mm. dia. before testing. As the cooling rate would otherwise be very rapid, due to the small size of the test-piece, controlled cooling was arranged to give the rate specified by the Japanese Industrial Standard test-piece (30-mm. dia., 300-mm. long) by heating the mould to 400 deg. C. Thus, the data can be compared directly with those obtained using the JIS test-piece.

Experimental Results and Comments

Effect of Temperature

Oxygen was blown into the molten metal at temperatures of 1,300, 1,400 and 1,500 deg. C., at rates of 0 to 2 litres per 100 gm. of molten iron; no inoculant was used. Fig. 1 shows the relation between the quantity of oxygen blown, the carbon and silicon contents, and the strength of the resulting material. The lower the blowing temperature, the more readily was the silicon reduced. When the temperature was high, carbon was more easily reduced. In the case of a heavy oxygen blow, the Si decreased below 1 per cent. and the iron became white. The tensile strength increased with the quantity of oxygen blown and also with the initial metal temperature.

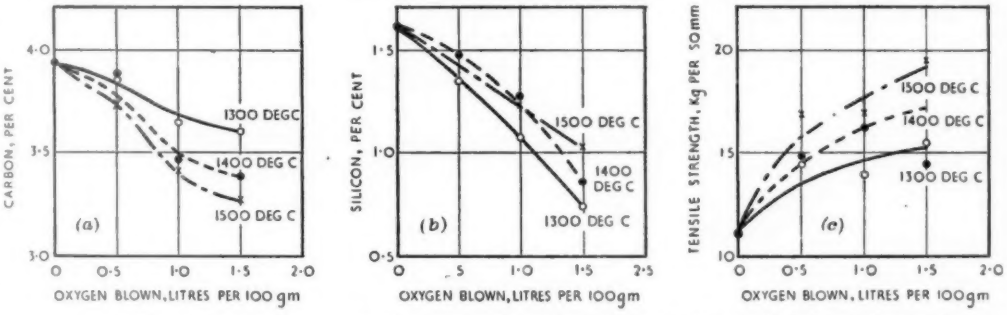


FIG. 1.—*Relation between the amount of oxygen blown into molten pig-iron and* (a) *the carbon content.* (b) *the silicon content and* (c) *the tensile strength of the resulting material* (*kg. per sq. mm.* × 0.635 = *tons per sq. in.*).

Effect of Inoculation

Calcium silicide, 0.5 per cent., was added before pouring the metal into the mould, and Fig. 2 shows the relation between the oxygen blown, carbon and silicon content and the tensile strength. The tendency to form white iron was prevented by adding CaSi, so that more oxygen could be blown than otherwise. The effect of initial temperature on the carbon, silicon and tensile strength was the same as in the first experiment. Blowing with 21 litres of oxygen per 100 gm. and using metal at a temperature of 1,500 deg. C., a tensile strength of

* Report from the Castings Research Laboratory of Waseda University, Japan.

† The Authors are respectively Professor Dr. Eng. and research fellow and research assistant of the University.

Oxygen Blowing of Cast Iron

28 kg. per sq. mm. (18 tons per sq. in) was reached.

In a further experiment, combined additions of 0.3 per cent. Si and 0.5 per cent. CaSi were added before casting and from the results obtained, Fig. 3 shows the same general relationships as before. In this experiment the quantity of oxygen could have been increased more than in the case of the addition of CaSi alone, and the maximum tensile strength of 32 kg. per mm.² (20.3 tons per sq. in.) was reached with 3 litres of oxygen per 100 gm.

In a third series, 2 per cent. of aluminium and 0.5 per cent. CaSi were added before casting and once more, Fig. 4 demonstrates similar relationships to those obtained previously. As aluminium is a strong deoxidizer working to prevent chill, the quantity of oxygen could have been increased more than was the case with the addition of Si and CaSi. The maximum tensile strength of 34 kg. per mm. (24.6 tons per sq. in.) was obtained with 4 litres of oxygen per 100 gm. As to the microscopic structure after the oxygen blow, the graphite became

(Continued on p. 316 at foot of col. 1)

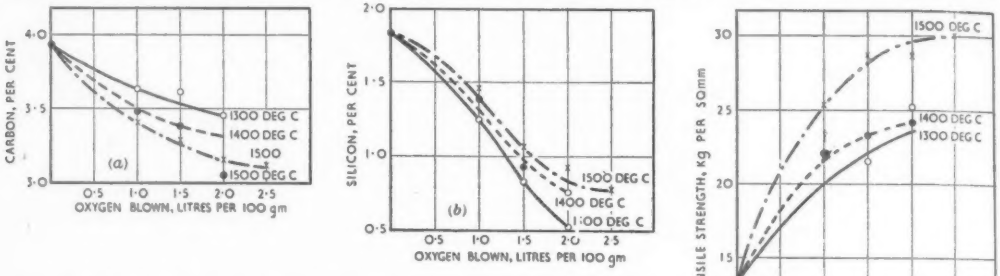


FIG. 2.—*Effect of oxygen blown into molten pig-iron on* (a) *carbon,* (b) *silicon and* (c) *strength of the material when calcium-silicide was added before casting the test-bars.*

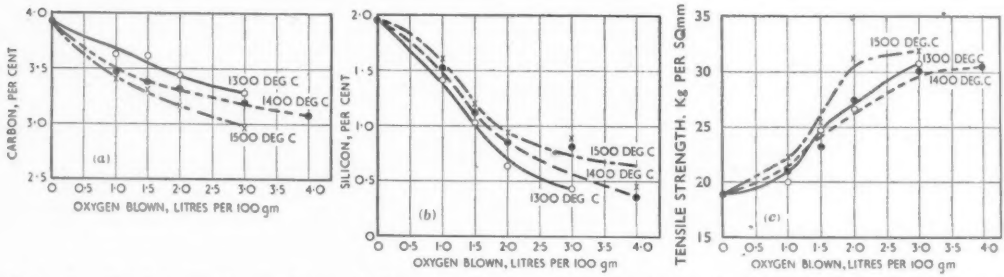


FIG. 3.—*Similar graphs to those of Figs. 1 and 2 to illustrate the results when both ferro-silicon and calcium-silicide were added before casting.*

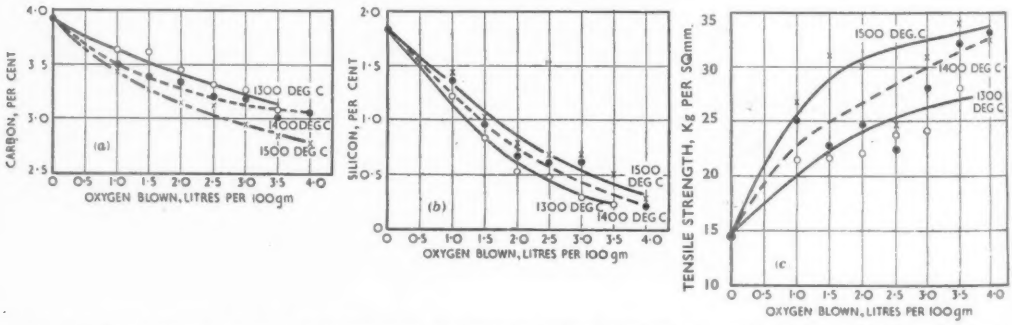


FIG. 4.—*Final series of graphs illustrating the results when aluminium and calcium-silicide additions were made before pouring.*

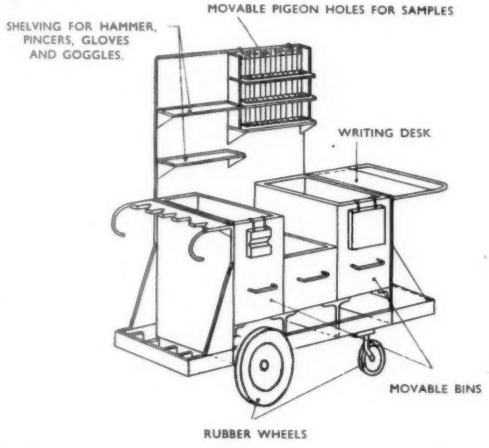
Cupola-man's Mobile Bench

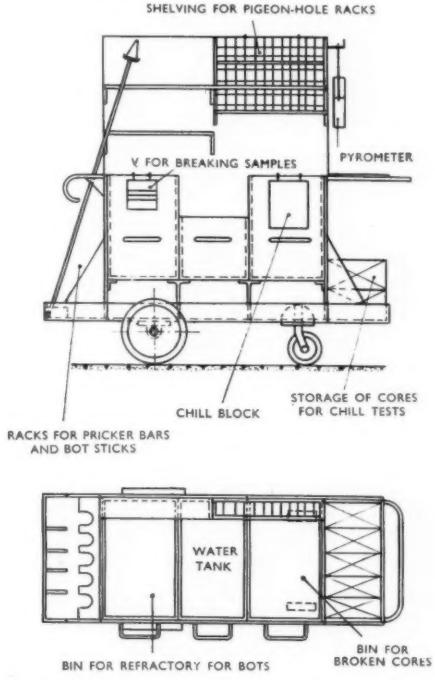
The *Journal d'Informations Techniques des Industries de la Fonderie* (No. 95)—a monthly publication of the French *Centre Technique*—carries an illustrated article on the construction of a mobile bench for use on the cupola plant. The apparatus described, and which is illustrated in Figs. 1 and 2, takes care of all that would seem to be necessary for the proper conduct of a cupola plant. Thus, it includes a bin for the refractory mixture for the bot; a water tank, useful for cooling the tapping bars, the wetting of the bots and quenching of samples; and a bin for receiving the broken cores after casting the chill-test samples (it should be noticed that the water tank is fixed, whilst the bins are movable).

There is also a rack for housing the tapping bars and bot sticks; shelving for storing the essential tools—tongs, hammer, etc.; a movable three-sectioned pigeon-holed store, numbered 1 to 36, for keeping the quench samples (the optical pyrometer being suspended from the side of this); a small table serving as a writing desk; and a cupboard for the storing of the cores and chills for the wedge test.

On the side, at the height of the bins, are hung the breaking V and chill block, which are kept on the floor during working hours. This bench is fitted with two large-diameter wheels and also two small pivoted wheels, as is shown in the illustration. It is provided with handles for ease of movement and does not take up too much room as its height is 5 ft., it has a width at the bin level of 1 ft. 4 in. and an overall length of 4 ft. 4 in. Its cost in France is of the order of £30.

FIGS. 1 AND 2.—*Perspective, elevation and plan views of the mobile cupola-man's bench described in this article. Though of French design, it is obviously of general application and could be constructed to suit individual needs as regards details.*





George Kent Mobile Exhibition

The mobile exhibition of George Kent, Limited, Luton (Beds), is making another extensive tour of the Continent and Scandinavia. Since its previous spell abroad showing industrial instrumentation, the exhibition has been well received at a number of important industrial centres in the UK.

Now, fitted with the very latest electronic developments, it is to visit Sweden, Norway, Denmark, Poland, Belgium, and east and west Germany, before it returns in early December.

Steel Scrap Imports

Following a recommendation by the Brussels Scrap Office to the High Authority of the European Coal and Steel Community imports of steel scrap from the US and Britain for the Common Market countries are to be resumed.

Out of a total of 300,000 tons to be contracted for by October 15, 250,000 tons will come from the US and 50,000 tons from the "UK and other neighbouring countries." Italy is expected to be the main buyer.

George Cohen Annual Report

The threat of the possible renationalization of the steel industry still remains. Surely it would be in the best interests of the nation to remove this uncertainty, states Mr. C. M. Cohen, chairman of the George Cohen 600 Group, Limited, in his annual review. "Let this highly efficient and progressive basic industry be informed immediately that it will, in future, be left to run its own affairs—which it has consistently proved itself capable of doing—without interference," he asks.

Regarding the suggestion that the machine-tool industry should be nationalized, Mr. Cohen says: "I cannot conceive of any industry less suited to this treatment." With few exceptions, its manufacturing units were relatively small and those responsible for directing its numerous concerns were essentially individualists. "Most of these machine-tool makers are very efficient and it is impossible to imagine that an imposed authority could contribute anything worthwhile to this vital industry, or do anything but harm."

During the year ended March 31, 1958, a drop in world steel demand, an "overnight cessation" of orders for general-purpose machine tools in the US, the Canadian recession, the intensification at home of the credit squeeze, and a shortage of sterling in some markets all had their inevitable repercussions on group businesses. While the directors do not view the long-term prospects with anxiety they expect difficult trading conditions to persist for some time. A realistic assessment of present trends required that the group budgeted for smaller profits.

Profits fell away in the second half, and particularly sharply in the last quarter. Total group turnover was slightly higher than for the previous year at £32,700,000 (£31,900,000), but, as predicted a year ago, margins were smaller. Group profits, before tax, fell by £522,813 to £1,813,815. The year's ordinary dividend is maintained at 12 per cent.

SIR JOHN CASS COLLEGE, Jewry Street, Aldgate, London, E.C.3, announce amongst many interesting higher technical courses one on "Absorption Spectroscopy," by Mr. A. R. Philpotts, M.A. (CANTAB.). This course consists of ten lectures and will be held on Friday evenings from 6 to 7 p.m., beginning October 3. Another, on "Statistical Methods in Scientific and Industrial Research," by A. J. Fennell, B.SC., PH.D., consisting of about 20 lectures, each of 1½ hours, will be held on Monday evenings at 6.30 p.m., commencing September 22.

Oxygen Blowing of Cast Iron

(*Continued from p.* 314)

comparatively small and evenly distributed and the pearlite in the matrix became slightly coarser.

These experimental results may be summarized as follow: When C and Si in molten pig-iron are lowered by oxygen blowing and an adequate inoculant is added, a low-strength cast iron can be developed into one having a very high strength. Silicon is generally the more readily removed—the majority of it being probably oxidizing before the carbon—and the iron easily becomes white. Accordingly, the temperature of the oxygen blow must be high to oxidize the carbon rapidly. The addition of a strong oxidizing agent is necessary.

REFERENCE

[1] I. Iitaka and K. Nakamura: Report of the Castings Res. Lab. Waseda University, No. 7 (1956).

Industrial Output Virtually Static

Little indication is given by the July index figure for industrial production of a revival in output. On a seasonally-adjusted basis output has remained virtually static at 134-5 since the end of April. During the same three-month period last year the index ranged from 139 to 142.

The latest index at 123-4 (1954=100) was five points below the level of July, 1957, and, as a result of holidays, there was a sharp drop of 14 points compared with June this year.

There has been a marked weakening in demand both at home and abroad since May and this has led to substantial shortening of order-books. Steel and coal have felt the effect of a marked de-stocking movement in recent months and steel production is currently running some 12 per cent. below last year's rate with no signs of early recovery.

Most of the capital goods industries still operate at a high rate of capacity, though order-books are shrinking in almost every case—most notably for ships and machine tools.

The numbers employed in manufacturing fell by 152,000 between June, 1957, and June of this year, and in mining and building by 38,000. The female force in manufacturing fell by 3½ per cent., compared with a drop of only 1 per cent. in male workers.

Unemployment in July was nearly 70 per cent. higher than a year ago and unfilled vacancies were 35 per cent. fewer than a year ago. Industries which have lost workers on an appreciable scale include steel sheet and tinplate (owing to the replacement of old-type steelworks and handmills in South Wales by continuous mills), bricks and cement, iron foundries, machine tools, timber and sawmilling, and shiprepairing.

American Foundry Research Laboratory

One of the largest and most modern industrial installations for the development of advanced methods of foundry technology in the United States has been put into full-scale operation by General Electric of America.

This is the Applied Research and Development Laboratory of the foundry department, which is providing the vital link between pure research developing new materials and processes, and the actual foundry use of such materials and methods as casting and improved production techniques.

The laboratory has a vacuum degassing chamber 9 ft. in diameter, the first of its type in use for foundry technology in the United States, to improve methods of eliminating gaseous impurities in molten cast metals.

Other projects underway include the development of improved methods of vacuum melting and processing of cast alloys to reduce impurities and improve cast properties; improved precision casting methods; and methods for reducing the quantity of metal needed for feeders in castings.

The £268,000 laboratory covers 22,000 sq. ft. of General Electric's Schenectady plant. It is one of the company's expansion plans which were initiated in 1955 to provide a total expenditure of £178,570,000 during three years.

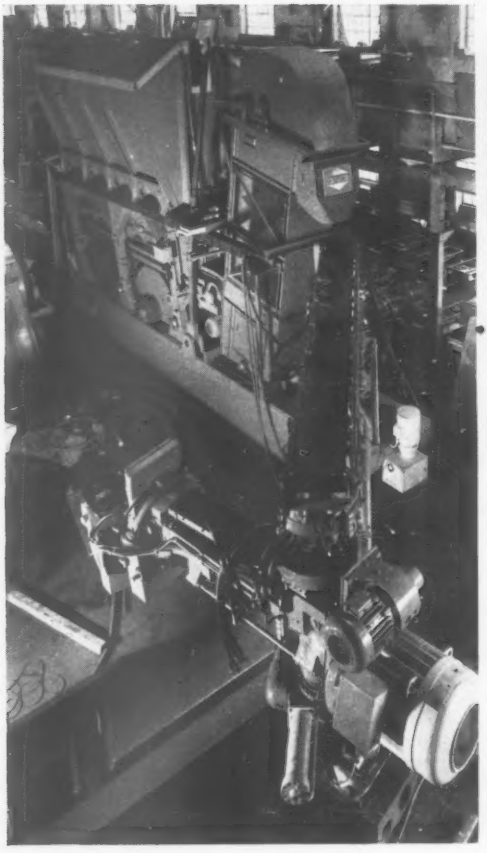
Survey of Belgian Foundries, III.

S. A. Cockerill-Ougrée

After a historical review wherein the origin and development of the Cockerill interests are explained, the account continues with notes on the salient foundry features, gained from a personal tour by the writer. In conclusion there is mention and illustration of a number of typical castings produced. The Cockerill works are to receive several visits by delegates during and immediately following the Belgium International Foundry Congress (Sept. 29 to Oct. 4).

If a student were asked to name six of the most important European metallurgical works, he would almost certainly include those associated with the name of John Cockerill. Cockerill—or Cockerell—was a Scot who emigrated to Liège in the early years of the 19th century, where he operated a small shop for the making of textile-engineering components. He soon moved to Seraing where, under

General view from the stockyard of the Strico hot-blast cupola plant at Cockerill-Seraing, and (right) interior of the foundry melting shop showing the hot- and cold-blast cupolas, and a hot-metal receiver.

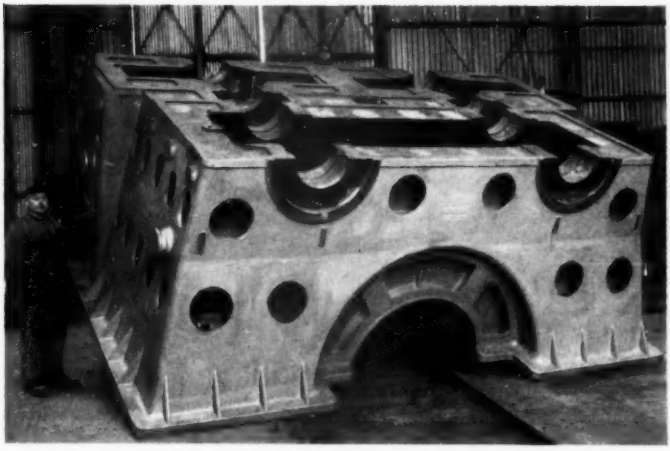


The sandslinger plant (left) by Badische Maschinenfabrik is claimed to be amongst the largest in the world. It has two seats for operators located at the impeller head. (Right) Workmen preparing to close a mould for a reduction gearbox of a marine turbine.

the patronage of King William I of Holland and Belgium, he established a larger works, located in the grounds of the Summer Palace of the former Bishop of the principality of Liège. This concern grew very rapidly and after amalgamation with the Société Angleur-Athhus, its activities included the operation of collieries, quarries, iron and steel works, rolling mills, shipyards and engineering shops.

Alongside the John Cockerill works was a second large metallurgical works, the Ougrée-Marihaye's Company, which had its beginnings in the Fabrique de Fer d'Ougrée, founded in 1836 by Mr. Gille Lamarche. His outstanding success in these early days (and chiefly since 1858) was a process he invented for the manufacture of steel tyres for railway work. He enjoyed a monopoly in this line for many years which continued with the advent of steel, when it was expanded to include rails and plates. The former Ougrée-Marihaye company was the result of a merger between the Fabrique de Fer d'Ougrée; the Charbonnages et Hauts Fourneaux d'Ougrée (coal mines and blast furnaces) and Charbonnages de Marihaye, and which quickly expanded to rank amongst the large concerns of Europe.

The Société Anonyme Cockerill-Ougrée was formed in June, 1955, by merging the interests of the two concerns and thereby became the largest limited company in Belgium, employing over 41,000 people. It embraces amongst its major activities four large departments:—(1) The mining of coal, iron ore, limestone, etc.; (2) coke ovens, blast furnaces, steel melting, hot and cold semi-continuous rolling mills, forges, cement works, etc.; (3) engineering works making diesel engines up to 20,000 h.p., locomotives, boilers, nuclear reactors, mining equipment and the like, and (4) shipyards capable of launching vessels up to 60,000 tons and other martime activities such as the "John



Fully-fettled casting made from the mould shown in the previous illustration.

Cockerill Line" (of The Minories, in London).

As is usual for such large concerns, foundry activities are undertaken, and John Cockerill actually operate three foundries. One is at Ougrée which furnishes castings for internal consumption and includes ingot moulds, rolls and for maintenance work. The second, previously the John Cockerill's foundry, is located at Seraing, whilst the third is of a specialized character and confines itself to the making of locomotive wheels and others for general railway applications.

Seraing Foundry

The Seraing foundry not only supplies castings for the adjacent shops, but those for the engineering and shipbuilding departments as well as for heavy engineering industry in general. The handling facilities available are such that the foundry is able to deliver to its customers iron and steel castings weighing up to 100 tons and non-ferrous components weighing up to 10 tons.

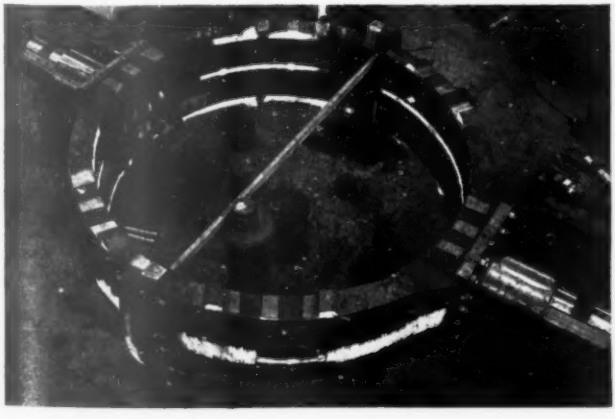
Personal Attention

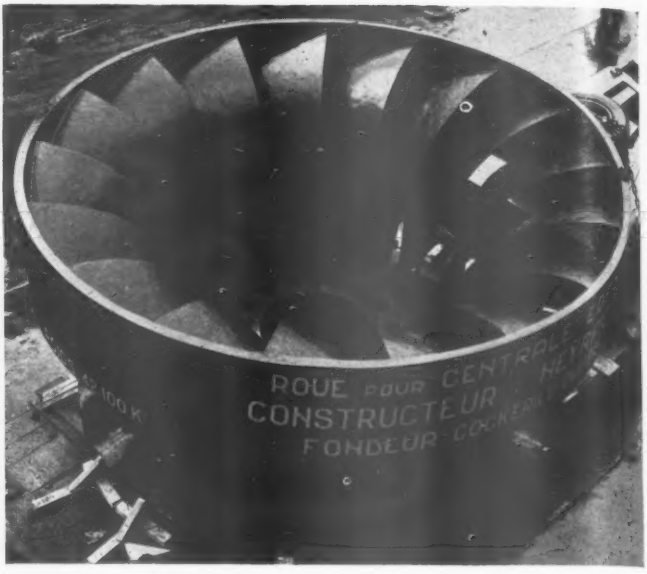
The writer counted himself fortunate in making a tour of this impressive foundry, chaperoned by Mr. J. Goffart, M.I.B.F., its manager, and in the company of Mr. M. C. de Jong of Holland, the immediate past-president of the European Committee of Foundry (Employers) Associations, together with his foundry manager, Mr. Van der Noek.

The foundry is an exceedingly high building covering an area of about five acres and spanned by a number of powerful overhead-travelling cranes, supplemented by a quantity of power-operated jib cranes. Loam moulding has been practised with outstanding success for generations in the Liège district and is still very extensively used—a great demand still exists for large iron castings made in this way from power stations and others users of large castings.

During the tour, Mr. de Jong made a plea for the replacement of loam moulding by the cement-moulding process, whilst the writer thought the

Steel castings employed for a Bessemer converter ring (left), made in halves, which together weigh over 50 tons, whilst the trunnions weigh about 16 tons. They are for delivery to Gutehoffmungshutte in Germany. (Right) Part of a group of steel locomotive-bogie castings for delivery to Argentine Railways; each weighs about 3½ tons.



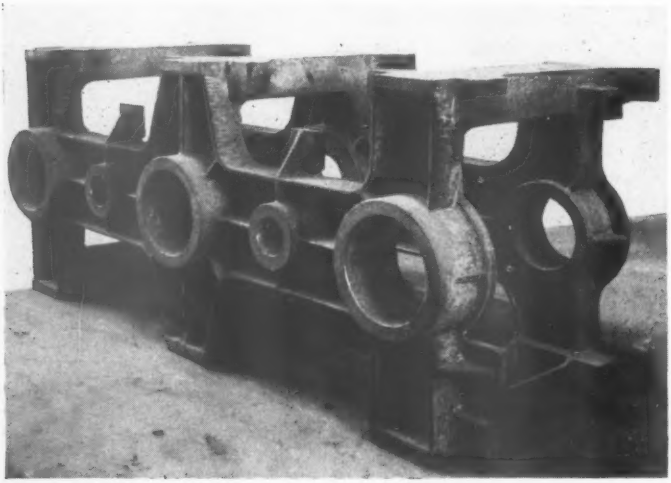


Rolling-mill housing, made as a one-piece steel casting weighing about 50 tons, and (right) steel Pelton-wheel casting weighing over 40 tons, made by Cockerill's.

CO_2 Process might go far to relieve the existing shortage of skilled moulders. Mr. Goffart, however, insisted that by breaking down the work of the loam moulder into small parts, or—to use modern jargon—by work simplification, this art still had a great future. He pointed out that by using such methods he had been able to quadruple the foundry productivity of 10 years ago. For example, in 1957 there were 500 workers (an overall figure) in the foundry, making 37,000 tons of castings of all types and sizes, including ingot moulds, engine parts, turbines, bogie frames, locomotive frames and general equipment, and thus production has been doubled from an initial 19,000 tons during the last decade. With the exception of the installation of a Hydroblast plant, no serious capital outlay had been involved.

New Plant

At the present time, considerable development schemes are in hand. The melting plant is being entirely changed. The five old cupolas (two of 8-tons, one of 10-tons and two of 5-tons per hour capacity) are being replaced by four. Primarily, there has been installed a 15 tons per hour hot-blast cupola by Strico (of which Cupodel is the British counterpart), and two of 10-tons and one of 5-tons per hour cold-blast units. These are of the Meehanite balanced-blast type. In addition, there is to be installed a 150-ton metal-mixer plant. This will, amongst other duties, provide a liquid charge for the open-hearth furnaces in the steel foundry. In the hot-blast plant, the designers have incorporated a pig-casting machine (by Sheppard & Sons,



Complicated steel casting weighing about 2 tons.

Bridgend). This is a single-strand machine carrying 120 moulds each to produce 45-lb. pigs. The speeds of the chain can be varied between 3- to 12-ft. per min. Included in the machine are arrangements for preheating and coating the moulds.

Steel Foundry

In the Cockerill steel foundry there are two 60-ton basic open-hearth furnaces, an 18-ton basic arc furnace and a smaller, rather old furnace of six-tons capacity which is reserved for the production of high-alloy steels. The other three furnaces, in addition to making steel for castings, also make it for forgings and some special ingots are cast for subsequent rolling. There is also another electric furnace for melting special slags used in connection with the Perrin process for phosphorus reduction. Additionally, there are three pits for the vacuum treatment of liquid steel by the Bochumer Verein process.

Moulding and Fettling Plant

Another innovation is the installation of what is thought to be the world's largest sandslinger plant. It has been supplied by Badische Maschinenfabrik of Durlach (Germany). It is of the type where the operator sits just above the impeller head, but in this case, two seats are provided in order that a "learner" can the more easily be instructed. This sandslinger plant delivers sand at the rate of 70 cub. metres per hour or over 40 cub. ft. per min. The question of an automatic sand mixing and distribution plant, controlled by punched cards, is under active consideration, for at the moment there are mills of the traditional type dispersed throughout the foundry.

In addition to the Hydroblast already mentioned, a large shotblast plant is being installed by Graber und Wening, a Swiss firm. A special plant is being installed for the moulding of mine-shaft segments in steel which is being served by the new sand-slinger.

It is obvious that with so many outside contractors about the foundry engaged on reconstruction, the general routine work gets a little disorganized, but a healthy production of 1,000 tons of steel castings, 2,700 tons of iron castings and some 30 tons of about 20 types of bronze and brass castings are turned out each month. The production of the foundry is obviously variable, as the illustrations show. Steelworks castings, such as rolling-mill plant, bogie frames, marine-engineering castings and the like are regularly produced. Apart from being Meehanite licensees, the foundry also produces nodular-graphite cast iron.

Most of the corework carried out in this foundry is of the air-setting or quick-drying variety, the bond being made to Cockerill-Ougrée's own specification.

Social Services

Social services provided by this concern are indeed widespread. There are two private fully-equipped hospitals, washing and bathing amenities at the works, canteen and staff dining rooms, a sports organization which includes football, golfing, swimming, tennis, fishing, basket-ball, and so on. Facilities are available for amateur theatricals, concerts, etc., and there is an hostel for bachelors; a cinema theatre is also among the many facilities offered to the employees.

Record Turnover for Sheepbridge Engineering

In his report for the year to March 31, 1958, the chairman of Sheepbridge Engineering, Limited, Lord Aberconway, mentions a number of new developments by the company and its subsidiaries. Among these is a new coupling particularly suited to the increased speeds of modern diesel engines, a versatile tractor shovel, and another production lathe. Lord Aberconway says that other developments which have been engaging the group's research establishments in recent years are now coming to fruition and will contribute to the company's revenue.

Turnover for the year to March 31 was a record, and a particularly busy year was had by two of the subsidiaries, Sheepbridge Engineering, Limited, and Sintered Products, Limited, where expansions and developments were most marked.

Group net profit for the year to March 31, 1958, increased from £394,722 to £435,167 and the dividend is up from 15 per cent. to 16 per cent.

CONTRACTS WORTH £2,362,000 for power station equipment and ancillary work were placed last month by the Central Electricity Generating Board. Companies receiving orders included the English Electric Company, Limited, A. Reyrolle & Company, Limited, Stewarts and Lloyds, Limited, Tarslag, Limited, and G. & J. Weir, Limited.

Wellman Smith Owen Group's Successful Year

Considerable volume of contracts was secured, both at home and overseas for steelworks plant and equipment, and orders for mechanical handling and processing units for the manufacture of steel strip again totalled more than £1,000,000, states Sir Peter Roberts, chairman of the Wellman Smith Owen Engineering Corporation, Limited, in his review for the year to March 31, 1958.

Further heavy machine tools were put into service at the Darlaston and Belfast works and orders have been placed for additional modern machines. These recent capital commitments are reflected in the group's balance of £384,000 outstanding on March 31. The proposed one-for-one scrip issue (announced last month) will take £600,000 from the capital reserve and £200,000 from the profit and loss account. Turnover and profits both created records in 1957-58. Group net profits rose from £285,173 to £396,395 and the dividend increased from 22½ per cent. to 25 per cent.

THE PRIME MINISTER, Mr. Macmillan, is to perform the opening ceremony at Derby on September 26 of one of the most advanced aero-engine testing plants in the world. Built by the aero-engine research and development establishment of Rolls-Royce, Limited, at a cost of almost £4,000,000, the plant can simulate actual flight conditions of altitudes of 12 miles and speeds equalling 1,800 m.p.h.

Equipment and Supplies

Dual-drum Swarf Separator

Of interest to non-ferrous founders operating their own machine-shops, is the machine illustrated in Fig. 1, made by Electromagnets, Limited, Bond Street, Birmingham, 19. It is known as the dual-drum swarf separator and incorporates two magnetic drums, each embodying Alcomax permanent-magnet units. These are so arranged that the tramp iron is extracted from the non-ferrous swarf and retained on the drum surface until it is rotated out of the non-ferrous feed and discharged into a separate container.

It is claimed for the machine that the efficiency of the drums has been improved as compared with earlier models, whilst the effectiveness of the separator has been increased by the design of the vibrating-screen trays which are now actuated by out-of-balance vibrator motors and replace the previous cam-and-roller mechanism. This innovation has made for a steadier feed of swarf on to the drums and has thereby increased the throughput.

The machine is fed by a chain-and-bucket elevator into the primary feed-hopper, which controls the feed on to the first feed-tray by means of a rack-and-pinion-operated regulating gate. The first drum removes the major part of contaminating ferrous material from the swarf, leaving the second one to deal with any residual matter. As an additional safeguard to ensure that any fine particles clinging to the oily swarf are removed, the bulk material passes over a permanent-magnet chute. The equipment has an output of the order of two tons per hour of non-ferrous swarf.

FIG. 1.—*Dual-drum separator in use for the elimination of magnetic material from non-ferrous swarf in bulk.*

Clutch Design

Tiltman Langley, Limited, development and research engineers of Redhill Aerodrome, Surrey, have produced what is thought to be the first roller clutch. This clutch is said to be suitable for use on any mechanism where robustness is of prime importance. It is small, has a positive drive, and can be controlled mechanically or electrically; in the latter case a suitable solenoid of 7-w. capacity can be used to operate the control

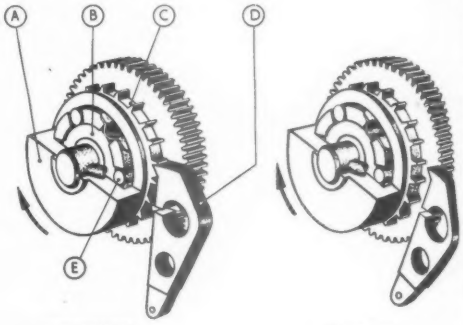


FIG. 2.—*Roller clutch developed by Tiltman Langley, Limited: (A) housing; (B) cam (attached to output gear); (C) control wheel (and roller cage combined); (D) pawl and (E) rollers.*

pawl. A power of about ½-h.p. at speeds in the range of 1,500 r.p.m. can be transmitted by this clutch, although this varies according to the nature of the load. The clutch is claimed to operate just as efficiently at −40 deg. C., or in tropical conditions, as it does under normal working temperatures.

The essential components of the clutch are illustrated in Fig. 2. In operation the housing (A) is the driving member and is shown driving in a clockwise direction. Considering the left-hand sketch, this shows the clutch disengaged. When the control wheel (C) is held stationary by operation of the pawl (D) it prevents the rollers (E) from being driven into the wedge formed by the housing and cam. If the control wheel is released (see right-hand sketch) the wheel is moved clockwise due to the friction of the springs between the cage and the housing, and thus the rollers are driven into engagement. On stopping the control wheel the rollers are kicked out of engagement and the clutch reverts to the left-hand sketch condition, *i.e.*, disengaged. There are various methods of mounting the pawl and solenoid in relation to the clutch control wheel, in order to provide different directions of rotation and to suit varying installation requirements. A range of standard gears can be supplied with the clutches, and where necessary, special gears will be made to customers requirements.

A NEW RANGE of heavy-duty compressors embodying balanced opposed design has been placed on the market by the Consolidated Pneumatic Tool Company, of 232, Dawes Road, London, S.W.6. Known as the "Class FE," the compressors, it is claimed, have outputs up to 5,000 cub. ft. per min. at low pressures and lesser outputs up to 1.33 tons per sq. in. For normal shop use at 100 r.p.m., compressors with outputs from 1,500 to 4,000 cub. ft. per min. can be supplied.

American Foundrymen's 62nd Castings Conference*

Further Papers from the Cleveland Congress

(Continued from page 235)

Recent statistics issued by the Penton Publishing Company, after a market research inquiry into foundry practice in the US, show that 20 per cent. of all American foundries are to-day using the CO_2 Process. With this background in mind the following papers on the Process which were presented during technical sessions of the American Foundrymen's Society at the Cleveland Castings Congress, last May, will be of considerable interest to foundrymen in the UK.

Sodium Silicates for the CO_2 Process

By E. A. Lange and R. E. Morey, Metal Processing Branch, Metallurgy Division, US Naval Research Laboratory, Washington DC.

The chemistry of the CO_2 sodium-silicate process for bonding foundry sand was investigated with particular attention to the composition of the sodium silicate, CO_2 utilization, and drying procedures. The rate at which strength develops with CO_2 is dependent on the $SiO_2:Na_2O$ ratio of the sodium silicate. The maximum strength developed with CO_2, is dependent on the $SiO_2:H_2O$ ratio of the sodium silicate and can be as high as 0.223 tons per sq. in. Drying ungassed sand mixtures will produce strengths in excess of 0.893 tons per sq. in. But the dry strength of sand which has been gassed with CO_2 is dependent upon the composition of the sodium silicate and the gassing time; dry strength can be less than the gassed strength.

The amount of CO_2 necessary to develop maximum gassed strength is that required to increase the $SiO_2:Na_2O$ ratio of the sodium silicate to 4. However, at low CO_2 flow rates the sodium silicate will absorb an amount of CO_2 equivalent to one-third of this amount.

Carbon-dioxide Cores in a Malleable Foundry

By George Nestor, National Malleable & Steel Castings Company, Cleveland, Ohio.

As high as 30 per cent. of the daily core production in the author's foundry is made with the carbon-dioxide or sodium-silicate process. Cores with low hardness, low-gas content and good collapsibility are required. The majority are made with a coreblower and few are made on the bench or by hand. In the experimental work over 50 different sand mixtures were tested, using various ingredients, mulling cycles, and sequences of additions.

Initial experiments made by adding sugar or molasses to the sand mixture showed that not until a specific grade of molasses was used were satisfactory cores produced. The results using two different grades of molasses are shown in Table 1.

The chief difference between the two different types of molasses is that A has a higher green-compression strength than B. This is of little importance since the cores are gassed in the box. The B mixture produces higher-gassed tensile strengths, higher core hardness, a lower moisture content and less gas. The cores made from mixture B could be handled, stored and used to make castings. The cores made from mixture A were too soft to handle.

TABLE 1.—*Molasses.*

—	A	B
Green compression, p.s.i.	1.37	0.71
Permeability	130.0	136.0
Moisture, per cent.	1.7	1.7
Flowability	87.0	82.0
Tensile (after gassing), p.s.i.	14.0	40.8
Density	100.5	100.6
After gassing:		
Moisture per cent	1.4	1.23
Gas content cc	21.0	16.6
Hardness	0.0	29.4
Constituents.	**A**	**B**
Sucrose, per cent.	24.6	38.0
Invert sugar	19.4	39.2
Total sugar	44.0	77.2
Ash	10.7	1.6
Solids	77.2	80.2*

* Brix solids.

Grade A molasses contains only 57 per cent. as much total sugar as Grade B. Grade A has an ash content approximately seven times greater than Grade B. (Table 2.) It has been determined from a great many experiments that an ash content of less than 2.0 per cent. is desirable. The sodium silicate used was a common commercial type, having a soda to silica ratio of 1.0:2.4 and a Baume of 52.

One of the most annoying problems to be overcome was stickiness in the corebox directly under the blow holes. A release oil, composed of 18 parts fuel oil to one part oleic acid, was added at the rate of two oz. to every 100 lb. of sand mixture to eliminate these conditions.

The cored surface of the casting was not as good as the surface obtained from cores made with core oil or resin. It was necessary to substitute 25 per cent. bank sand for 25 per cent. lake sand, with two per cent. of iron oxide added. This mixture produced a casting surface comparable to the 100 per cent. lake-sand mixture containing core oil or resin. Table 2 shows the sand mixture which produced satisfactory results. Mulling times are kept at a minimum but may vary slightly with different types of mills.

All cores are gassed at 25 lb. per sq. in. for from

* Abstracts from technical papers presented during the American Foundrymen's Association's technical sessions at the 62nd Castings Congress held in Cleveland last May have already appeared in the JOURNAL, July 3 and August 21, 1958.

AFS 62nd Castings Conference

five to 10 sec. The CO_2 gas consumption varies between 50 to 70 lb. per ton of cores. Core weights vary from a few ounces to 50 lb. The CO_2 Process has resulted in a savings of 20 per cent. over the core-oil sand process, an economy primarily due to the labour reduction in core handling.

TABLE 2.—*Sodium-silicate Sand Mix.*

450 lb.	Lake sand
150 lb.	Bank sand
6 lb.	Coal dust
12 lb.	Iron oxide
19 lb. 8 oz.	Sodium silicate
4 lb. 13 oz.	Molasses
12 oz.	Release
Mixing cycle—1 min.	with dry ingredients
1 min.	with sodium silicate
1 min.	with molasses
1 min.	with release

Sieve Analysis.

Sieve No.	Lake sand.	Bank sand.
30	0.4	0.2
40	4.5	0.8
50	20.2	5.1
70	46.5	19.5
100	27.8	56.1
140	0.6	15.9
200	0.0	1.2
270	0.0	0.3
PAN	0.0	0.9
AFS grain fineness	52.82	71.95
Clay, per cent.	0.13	1.0
Carbon, per cent.	0.26	0.26

Investigation of the Hardening of Sodium-silicate-bonded Sand

By Carl E. Wulff, Instructor, department of mining and metallurgy, University of Wisconsin Madison, Wisconsin.

The hardening of sodium-silicate-bonded sand was studied by three methods:—(1) Carbon-dioxide hardening. (2) H_2O evaporation hardening. (3) Thermal hardening. Tests were performed with the following materials: (*a*) silica sand, washed; (*b*) AFS grain-fineness number 50.5; (*c*) binder: commercial sodium silicate—ratio $Na_2O:SiO_2=1:2.4$, solids —46.9 per cent., viscosity 17 poises, baume 52 degree; (*d*) gas: proprietary carbon dioxide.

The chief merit of carbon dioxide lies in its ability to harden the sand mixture rapidly and produce half its maximum strength in 10 sec. Overgassing quickly results if CO_2 hardening is the only hardening mechanism acting. The gassing time required to reach maximum strength varies with the percentage of binder in the sand. Sodium-silicate sand will harden by the evaporation of moisture from the binder as indicated by the hardening of specimens in room atmosphere.

Most hardening of sodium-silicate sand cores is a combination of CO_2 hardening and evaporation hardening. The highest strength that can be obtained is by heating the specimen or thermal hardening. By this method much higher strengths are obtained, the high strengths are retained and thermal set is drastically reduced by prior CO_2 hardening.

Moreover, fracturing of the binder film does not seem to occur as readily as in evaporation hardening. Thermal hardening at 185 deg. C. produced maximum strength. This is a way of obtaining high strengths with moderate binder percentages.

Conclusion

Hardening of sodium-silicate-bonded sand can be accomplished by the three methods mentioned above, *i.e.*—CO_2 hardening, H_2O evaporation hardening and thermal hardening.

The problem concerns skin formation of castings, although achieved by different mechanisms, appear to be similar. Thermal hardening is different from the CO_2-evaporation hardening, but in the lower-temperature range of oven baking it is still a reversible process. Long CO_2 gassing is of no advantage, and for economic reasons evaporation set is recommended. Thermal hardening produces high strengths at moderate binder percentages. Room temperature core deterioration can be of two types:—(*a*) fracturing of binder (moisture loss), (*b*) softening of binder (moisture pickup). The amount of moisture in the atmosphere will affect the rate of deterioration.

Shell Moulding for Steel Castings

*By R. G. Powell and H. F. Taylor**

The unacceptable surface condition produced on low-carbon and low-alloy steel castings made in shell moulds was believed to be caused by an unfavourable time relationship between skin formation of solidifying castings and the strong evolution of gas by the resin of the shell moulds. Mould materials which exerted a chilling effect were believed to be beneficial.

The problem concerns skin formation of castings. Data on thermal conductivity of olivine (commercial forsterite) were furnished by Dr. Aslak K. Valheim of the Government Raw Materials Laboratory in Trondheim, Norway. Olivine is extensively used in general foundry practice in Norway. Approximate values of heat diffusivity of silica sand, zircon and forsterite at low temperature shows that forsterite has greater cooling ability than zircon, and about twice that of silica sand.

Indications were that calcium carbonate, like forsterite, chilled the surface of castings. Moulds containing increasing amounts of calcium carbonate powder up to 5 per cent. produced great difficulties. The problem of mould strength was solved by using about 10 per cent. granulated limestone blended with silica sand.

Difficulty was experienced when using forsterite shell moulds in poor sharpness of detail. In the case of granulated-limestone/silica-sand blends, there may be some trouble with metal penetration. This can be minimized by using finer limestone and pouring without much superheat.

Best results are obtained when the forsterite or the silica/limestone blend are used in composite shell moulds having a thin facing of fine silica sand made by a double investment process.

* The Authors are attached to the Massachusetts Institute of Technology.

(*Abstracts to be continued*)

Foundries in the Hawker Siddeley Group

Wide-ranging Facilities in UK and Canada

The wide-ranging foundry associations of the Hawker Siddeley Group are seldom realized even by foundrymen themselves and the JOURNAL is indebted to Sir Roy Dobson*, a director of Hawker Siddeley, for permission to print the following summary.

Great Britain

High Duty Alloys.—When High Duty Alloys was formed in 1928, it was concerned mainly with forging—the company set out to meet the demand for strong, reliable light alloys which had been created by the inadequate scope offered by the then available engineering materials. But excellent craftsmanship, emphasis on research and the quality of the product at all times, and a willingness to co-operate with customers in the provision of technical advice and assistance in any way possible, resulted in rapid expansion to the leading position the company now holds.

To-day the company has five separate divisions in England and Wales, each specializing in one main branch of the overall activities. The headquarters are at Slough, where there are two divisions —those of research and casting. The research laboratory is one of the finest in Europe and the metallographic section, chemical laboratory, mechanical-test section, experimental foundry and corrosion laboratory are particularly worthy of mention.

In the casting division, well-equipped foundries cater for sand, gravity- and pressure-die-casting in both aluminium- and magnesium-base alloys. A large variety of castings is produced, ranging from aircraft-engine diffuser-rings to rainwater pipes. The pressure-die-casting foundry is one of the most up to date of its kind in the world and contains two of the largest machines in Britain. Die-castings can be produced, with fine accuracy and finish, varying from 1 oz. to 30 lb. in weight. As is the case with all the production divisions of High Duty Alloys, this division is a completely self-contained unit having its own laboratories which deal with day-to-day metallurgical problems, its own heat-treatment shops, tool-rooms and ancillary equipment peculiar to the type of work undertaken.

National Foundry.—The National Foundry is run as a separate division of the National Gas and Oil Engine Company, Limited, of Ashton-under-Lyne. This latter company is a member of the Brush Group which became part of the Hawker Siddeley Group in 1957. The foundry fulfils the needs of its own factory and also accepts work from other Brush Group companies. National Gas being a diesel-engine factory, the National Foundry mainly produces engine details weighing from a few pounds up to large bedplates and crankcases moulded and cast in pits, the moulds being usually skin dried, prior to casting, by means of gas jets.

The plant includes a battery of Pneulec machines with capacities of from 1,500 to 4,000 lb. It is equipped with conveyors, tunnel-type mould-drying stoves and mechanical knock-out and sand-handling plant. Cores are extracted from the raw castings by means of a Hydroblast plant and the sand is dried and reclaimed. National was the first foundry to manufacture high-duty acicular iron on a production basis; this is used for valve levers. gears, valve seats, etc., and is produced with a tensile strength up to 30 tons per sq. in. The largest single casting which can be accommodated in the foundry is of about 12 tons weight and the approximate annual output is 4,000 tons.

Canada

The A.V. Roe Canada Group came into being in 1945; it originally comprised an aircraft company—Avro Aircraft—and an engine company—Orenda Engines. Several industrial companies later became part of the Group, one of which was Canadian Car and Foundry Company, Limited. In 1956, however, the foundry division of Can-Car became a separate company known as Canadian Steel Foundries (1956), Limited.

Canadian Steel Foundries (1956), *Limited.*—Built in 1913, this plant has expanded continuously to become the largest and one of the most modern of its type in Canada, with well over 1,000 employees and works covering an area of over 600,000 sq. ft. There is scarcely a country in the world which does not use castings from this foundry; they range from a few ounces in weight to 67 tons. Its products are used in a most varied range of industries, from rail transport to marine engineering, from steel mills to paper mills and from mining to motor cars.

Facilities Available

Melting facilities include basic open-hearth furnaces of 50 tons capacity—with four heats a day —and three smaller electric furnaces (acid and basic), for special melts of smaller quantity. An 8,000 ton stock of sand is kept in five concrete silos ready for blending at the rate of 230 tons an hour in six semi-automatic mixers. Used sand is reclaimed by wet scrubbing and calcining at a continuous rate of 10 tons an hour. In 1956, the company installed what is claimed to be the world's largest shot-blasting plant—a gigantic structure of 10,800 cub. ft. working capacity. Castings are

* See pages 310 and 311 of this issue.

Hawker Siddeley Foundries

taken into this plant on rail cars and on reaching the cabinet they are placed automatically on a turntable inside: a large steel door is then closed by push-button control and the cleaning begins.

During the cleaning process, the castings are bombarded with steel shot at the rate of over a ton per minute and continuous revolution of the turntable ensures that every part of the load receives its share of the abrasive "hail." The speed of the turntable and the amount of abrasive are regulated by remote control. Loads up to 28 by 22 by 12 ft. in size and 100 tons in weight can be dealt with at one time. Dust is removed by dust collectors which clean 30,000 cub. ft. of air a minute. After use, the abrasive falls through spill-hoppers under the floor to be reclaimed by a series of gravity hoppers and shaker conveyors and returned by a separating and re-cycling device. Finishing of castings is carried out in the product machine-shop, with planes, boring mills and drills, some of which are of the heaviest type made. As an example of some of the jobs undertaken by this company, eight castings weighing 80 tons each were recently produced for use in a hydro-electric power scheme on the Niagara River. Perhaps the most impressive job to date has been a valve head for a hydraulic press with a poured weight of 120 tons—Canada's heaviest-ever casting. The company, with an output of 4,000 tons a month, supplied a third of all castings produced in Canada in 1957.

Dominion Steel & Coal Corporation, Limited.—This industrial giant was the latest to come under control of the Hawker Siddeley Group through A. V. Roe Canada, Limited, in 1957. With its 250,000 employees and powerful resources of ore and limestone deposits, coal mines, furnaces, rolling mills, ships, shipyards and railways, Dosco is the biggest economic unit in Canada's four Atlantic provinces. It is a truly Canadian company, using almost exclusively Canadian raw materials and its yearly sales turnover tops $200 million. The heart of Dosco is a steel plant in Sydney, Cape Breton Island, where over 500 acres of furnaces and rolling mills produce some 900,000 tons annually mainly in the form of primary steel.

Dosco ingenuity made history in the world of steel with an outstanding technique for supplying raw materials. Red-hot ingots are shipped from Sydney and Montreal to arrive in Trenton hours later—still red-hot. Packed in vermiculite, a 75-ton ingot cools by only 80 deg. C. during the journey. This greatly reduces the task of re-heating the ingot. The method is unique in North America and probably in the world.

(Unfortunately, no detailed information on any of the 33 subsidiary and associated companies of the Dominion Steel and Coal Corporation Limited is yet available; consequently no specialized remarks on Dosco foundries can be included in this brief review.)

BARROW HAEMATITE STEEL COMPANY, LIMITED—Mr. Patrick G. Cumming and Mr. Norman S. Grieve have resigned from the board.

Smelters of Swansea

The Romans mined copper ore in Wales but its smelting there did not become of great importance until the Tudor period. By the time of Elizabeth I much Cornish copper ore was exported to Neath to be smelted. But in 1695 Welsh copper, from mines in Cardiganshire, was brought by sea, to a copper works at Melyncryddan, near Neath, which also drew upon Cornish and foreign mines for its ores. Landore set up its first copper works in 1717 and during the early half of the 18th century other copper-smelting works came into being in the Swansea area.

The discovery in 1762 of very rich copper deposits at the Parys Mountain in Anglesey gave Swansea its greatest impetus as a copper-smelting centre. Soon more than 20,000 tons of ore were being produced every year in Anglesey and exported in coasting vessels through Amlwch to Swansea. Some ore was also sent by sea via Beaumaris for processing at Holywell in Flintshire. At one time 1,000 workers were employed in Anglesey in connection with the copper-mines. Furnaces to reduce the poorer copper ores were set up at Amlwch but the richer lodes were exported untreated to Swansea.

In South Wales more copper-smelting was undertaken, not only in Swansea but also at Llanelly, Neath and Risca in Monmouthshire. It was Swansea which became the great copper-smelting area and in 1860 of the eighteen copper works in Britain, seventeen were in this region. The Swansea Metal Exchange became the copper trade centre for the world and from 1860 to 1890 Swansea was the greatest copper-smelting area in any country. Copper ore during that period came from Antofagasta and Valparaiso in the "Cape Horners"—the sailing ships which plied out of Swansea to Chile around Cape Horn.

In spite of the decline of Swansea copper in relation to other world production, the area has retained its tradition for the smelting and processing of non-ferrous metals. About 40 kinds of metal ores are dealt with in over 100 works. Swansea is the largest producer of zinc in Britain while the great Mond Nickel Works at Clydach in the Swansea Valley is the largest of its kind in the world.

Tilghman's Pneumatic Tools Agency

To cover adequately the ground opened up by the granting of the sole selling rights in Britain of the pneumatic tools manufactured by Gebr. Bohler & Company, Vienna, Tilghman's, Limited, Altrincham (Ches), has inaugurated a pneumatic-tools division. The Bohler range includes tools for the metalworking industries, mines, quarries, and public works.

The new division, which will be under the management of Mr. F. Marsh at 1, Chester Street, London, S.W.1, will work in close collaboration with the existing air-compressor division. This latter division, which produces compressors with capacities from 50 to 6,000 cub. ft. per min. and pressures up to 1,000 lb. per sq. in., has embarked on the manufacture of a range of air-cooled diesel-driven portable air compressors.

Notes from the Branches

Northampton Section

Visit to Thames Foundry of Ford Motor Company, Limited

Following closely upon the official opening on May 27 of the new Thames Foundry of the Ford Motor Company, Limited, the Northampton and district section of the Institute of British Foundrymen visited this plant in July. A party of 35 members and visitors went by coach to London and then down river to the works where they disembarked on the Ford Motor Company's own jetty and spent a most interesting afternoon in the Thames Foundry, the firm's Dagenham foundry and inspecting the machine shop and final assembly lines. The tour of the Thames Foundry was, of course, the main purpose of the visit and members were most impressed by everything they saw, though not a little surprised at the absence of shell coremaking and moulding equipment.

Building and Services

The building, together with its services, was considered to be the planners' biggest achievement rather than the degree of mechanization put into it. Here is a real example of Ford pioneering, showing a touch of the same enterprise responsible for introducing such accepted practices in the motor industry as solid tappets and cast crankshafts—no more roof glass to clean and keep watertight, to make the building hot in summer and cold in winter. The idea of a flat concrete roof on which is fitted all the dust- and fume-extraction plant, together with air conditioning equipment, is surely a great advance, because this shop is as light as any which uses roof glazing, thanks to the efficient use of 5-ft. fluorescent lighting fittings over working areas.

Opening windows are fitted in the shop walls above a height of 6 ft. and the ventilating equipment, which is thermostatically controlled, supplies cool air in summer and warm air in winter, the total volume withdrawn being a million and a quarter cub. ft. per minute, which provides a working atmosphere as good as any machine shop—in fact the visitors said they had seen moulding-machine operators in other foundries working in worse atmospheres than the shakeout men in this new building. Some people would argue that it has been overdone, but if output per man/hour is in any way connected with working conditions, then Ford's will reap the benefit of this expenditure for the next 20 years, quite apart from the facility with which they will be able to get labour for the tougher foundry jobs, and the peace of mind they will enjoy when many employers are worrying about pneumoconiosis and the Clean Air Act.

The ground floor of this building is taken up by offices, canteen, amenities, maintenance department, compressors, coal-dust, sand-bond and finished-castings stores, whilst the production floor is actually the first storey. In the same way, the two pairs of 30-tons per hour hot-blast cupolas are on the first floor but the stock bins and railway wagons supplying the charging equipment are on the ground floor, hence the tops of bins and wagons are level with the weigh hopper, and hoisting and lowering of the overhead crane magnet is reduced. A very obvious advantage of this two-floor idea is, of course, the ease of installing and maintaining sand-spillage conveyors and shakeouts, and, whilst it is certain that the site conditions and water level influenced the Ford engineers in their decision to use two floors, it is interesting to reflect on the possibility of their having adopted this practice on a more normal site.

Layout

The main foundry building is 1,200 by 180 ft. and, whilst half is devoted to moulding, core storage, and melting, the other half is taken up by coremaking and fettling, the finished castings being sent down on to the ground floor by goods lift. An ancillary building about 125-ft. away (and one-fifth the size) runs parallel with the main building and houses the casting cooling and stripping area, together with flash grinders. These last-named machines begin the fettling operation by grinding the flash off the joint and sump faces of a cylinder-block casting simultaneously, whereupon the castings are returned to the main building for shot-blasting in two six-wheeled continuous-conveyor-type Wheelabrators, followed by fettling. This building also contains the new sand-drying plant consisting of two gas-fired drying columns of total capacity 25 tons per hour, the dry-sand hopper holding 600 tons—the same as the wet-sand hopper.

These two buildings are linked by two long pendulum conveyors carried in enclosed overhead bridges, one taking hot castings out of the main building and the other bringing them back. These two conveyors are typical of Ford's adoption of very long pendulum conveyors and are apparently of sufficient length to allow castings to cool completely, without the need to off load, though, due to lack of time, the IBF party were not able to go inside the ancillary building.

Fettling is carried out on variable-speed conveyors, all running parallel with each other. Normal portable fettling tools are in use and a shotblast cabinet is provided for each conveyor. The internal transport system was composed entirely of electric elevating platform trucks and fork-lift trucks, with an ample supply of stillages and racks for storing cores.

Moulding

The foundry has been put down for the manufacture of 350 tons of castings per day—cylinder-heads and blocks on one moulding line and heavy tractor castings on the other—and the principles employed in the layout are quite normal although the whole has all been extremely well engineered.

Each line consists of a mould conveyor in the form of a continuous loop 822-ft. long, with pallets at 6-ft. centres and an extremely smooth caterpillar-drive unit which can be varied to give speeds from 12 to 24 ft. per min. The moulds are made in very heavy cast-steel box-parts, 45 by 30 by 16 by 16 in. This is the only box used in the foundry, so that every job has to go into this one size. The mould is made on O/J 12/36 jolt/squeeze "straight-through" Osborn moulding machines (eight to each line), the sand being supplied from four sand mullers, each with its own overhead sand hopper, giving a total sand output of 200 tons per hour with sand bunker capacity of 250 tons, again to each line.

Sand and Metal

Sand bonding material is delivered in bulk containers by road and coal-dust in 17-cwt. capacity skips. Eight storage hoppers can hold up to 100 tons of bond and 140 tons of coal-dust, all of which is prepared for use as a slurry and piped to the sand mullers. These can be brought in as required to meet the sand demand and can be operated either by hand, single-batch automatic, or repeat automatic as desired. Each moulding-machine hopper can take five tons of sand and the ploughs on the belt are operated by electrical level equipment fitted inside these stainless-steel-lined hoppers.

Notes from the Branches

Molten metal is fed from the cupola's continuous tapping-spout by crossed launders to any one of four 8-tons capacity gas-fired hot-metal tilting receivers and the castings are poured from 18-cwt. capacity one-man-operated, geared, barrel-type ladles carried on electrical wire-rope hoists. Ten of these units are provided and they can be travelled electrically at two speeds, in addition to being latched into an overhead chain over the mould conveyor. In this way, the ladle once positioned above the pouring cup of a mould is kept in position without effort on the part of the caster, until it is unlatched for movement to the next mould. Immersion pyrometers are used for checking the temperature of all metal prior to pouring and these temperatures are recorded as well as being readily observable by an inspector.

The coreshop, again, is laid out on orthodox lines with the exception of the punched-card system of mixing core sand, which, of course, looks very impressive. It will be most interesting to see how successful this equipment is over the next few years and one wonders if sufficient saving in manpower will be made to justify its use. The mixed sand is conveyed by air to the coreblowers, which are supplied with air at 125 lb. per sq. in. instead of the normal 95-lb. per sq. in.—this must be an enormous advantage in blowing a really good core. The piping layout is most generous, so that ample reservoirs of sand are available close to the blowers. Other compressed-air equipment is, of course, fed through pressure-reducing valves from the normal 125-lb. per sq. in. line-pressure maintained by 10 double-acting two-stage compressors each of 760 cub. ft. per min. capacity. (Incidentally, the Ford Motor Company must be thinking of installing a considerable amount of extra equipment, as the compressor house can accommodate five more machines.)

Cores

Nothing revolutionary was seen in the coreshop, but, as is to be expected, this is equipped with first-class coreblowers. Eleven Osborn blowers are installed and it is understood more are on order, whilst the largest blowers have been supplied by Beardsley Piper from America. Some coreshooters are also in use and, as has been previously mentioned, all are supplied with mixed core sand pneumatically delivered into the hoppers over the blowers. When the level indicator in the blower-hopper has signalled back to the sand mixing station that sufficient sand remains in the blower for only 15 mins. work, it also signals the particular mix of sand needed, *i.e.*, mixture A, B, or C, etc., and the operator in the mixing control room selects from a rack the appropriate punched formula-plate for insertion into the formula-plate "reader." Depression of a button initiates the weighing and metering of the ingredients, but discharge into the mixer is not executed until a further button is pressed which also starts and completes the mixing operation and automatic discharge into the turbo-drive vessel ready for conveying to the coremaking stations *via* one of two 14-way pipe-selector switches.

In order to make a large tonnage of automobile castings a very large number of accurately-made cores is needed and this coreshop is carefully laid out to provide just that. The core-storage area is almost half as big as the coreshop itself and sub assembly of cores in this area is carried out whenever possible, so as to reduce coring-up time on the moulding lines. Core-drying ovens and the core-wash drying ovens are all of the horizontal type, so that there is no intermediate unloading and loading to be carried out, the coreshop pendulum conveyor passing straight through the stove and on to the dressing and storage area. All these ovens, which naturally take up a considerable amount of space, are placed overhead so that useful floor area is not wasted and—most important of all—the heat radiated from the ovens and the hot cores coming out is already in the roof space and easily discharged to atmosphere, thus affecting the coreshop temperature hardly at all. Here again, much thought and careful planning have provided the right type of core ovens in absolutely the right place and it is evidence of this sort of planning rather than attempts at full automation which appealed so much to the visitors in the Thames Foundry.

Other Matters

There are many other things worthy of mention, such as a 20-tons per hour pig-casting machine, a back-scrap conveyor and sprue mill, and two large sedimentation tanks, with cooling ponds for granulating cupola slag—and disposing of all the dust-laden water carried down the sluice from the dust-extraction equipment on the roof. The dust-disposal system itself is a first-rate idea, apparently being completely successful and so very much better than anything previously seen by the visitors for disposing of shotblast machine dust, which is such an awkward material to handle.

It is realized that not everyone can build a foundry like the Ford Motor Company, not only is money not available in sufficient quantity, but the output required is probably such that the initial expenditure would take too long to recover. However, in the opinion of the visitors, any concern contemplating building a new foundry would be well advised to ponder awhile on some of the principles used in the erection and equipping of the Thames Foundry.

The members of the Northampton and district section of the Institute of British Foundrymen would like to record their wholehearted appreciation of this most interesting visit and of the extremely generous hospitality shown to them by the Ford Motor Company, Limited, who spared no effort or expense to make this visit a complete success.

South Africa

The first meeting of the new session of the South African branch was held in Johannesburg on July 24, when the new branch president, Mr. R. C. Cross, was in the chair. A profusely illustrated lecture, entitled: "Electric Furnaces for Metal Melting" was presented by Mr. S. G. King, the manager for South Africa of Birlec, Limited.

The paper reviewed the main types of electric melting furnaces of special interest to the foundryman in three main groups: (1) induction, (2) arc and (3) resistance. In the first category, the author dealt with coreless induction furnaces, the core-type induction with the submerged channel and the core-type induction unit with an open channel. Direct-arc, indirect-arc and submerged-arc furnaces were dealt with in the second group and the third group included radiant-resistor, indirectly-heated resistance furnaces along with crucible or bath, and conduction-heated furnaces.

Temperature

Dealing with maximum temperature attainable, the author made the following observations: "With electric induction and arc furnaces, the highest practical temperature is generally limited only by the refractory lining material or the way in which it is put into the

furnace. In fact, the temperature problem is really one of confining the heat in the most efficient way. With resistance-heated furnaces, the maximum temperature is generally limited by the material from which the resistance elements are made, and the temperature gradient between these elements and the charge itself."

The author stated that one of the great advantages of electric power is its flexibility. With proper design, very high power could be injected into a very small volume and at any time this power could be reduced either gradually or in well-defined steps right down to zero. Thus the melting times and rates which could be attained with electric furnaces varied over an enormous range, and practical considerations, such as refractory costs, power consumption, and metallurgical requirements, often determined the maximum rate which should be applied in each case.

After discussing the various types of refractories available for different types of furnaces, the author indicated the range of furnace capacity, and, dealing with the future, stated that direct-arc units up to 300 tons, have already been schemed out in readiness for the market demand. The paper was concluded by a section dealing with economic considerations related to electric-furnace melting. An extremely interesting discussion followed the lecture and the evening was concluded by a hearty vote of thanks to the author for a very informative lecture, the importance of which could be gauged by the large number of members and guests present.

Syllabus

The fourth syllabus of the South African branch has been published, covering the period July to December, 1958. An introduction to it by the branch president, Mr. R. C. Cross, comments on the healthy state of the local IBF affairs and appeals to all members to attend meetings regularly, contribute papers, promote discussion and bring along interested friends. The syllabus contains a full list of branch members and subscribing firms, besides a copy of the annual report and balance sheet. The following activities for the session have been arranged: August 28—lecture: "Foundry Organization" by Mr. R. T. Rounce; September 25—film evening (ladies invited); October (date to be arranged): works visit to Dunswart Iron & Steel Works Limited, Benoni; October 23: lecture and sound film—"Modern Equipment for Rapid Analysis of Cast-iron," by E. Beaver and S. Chrobok, and November 27: film evening—"Erection and Establishment of a Steel Melting Plant," by H. McC. Lawrence.

IN A RECENT PUBLICATION of the Birmingham College of Technology, Sir David Anderson, director of the Royal Technical College, Glasgow, urges recognition of the fact that there is absolute equivalence between the new Diploma of Technology and the B.SC. degree. He says that the question of the relative roles to be played by the universities and the major technical colleges in the field of technology are entering a new phase. The idea that technical colleges provided a more "practical" type of course and the universities the theoretical approach is now obsolete. There has been a "remarkable" change in the attitude of industry to technical education over the past 30 years, and as a result sandwich courses were springing up in many of the large colleges. He concludes by saying that there were now two routes to the same goal and a substantially larger number might well elect to take the sandwich route.

Book Review

Materialfluss in Giessereien, Part 2 (Materials Flow in the Foundry, Part 2). By W. Gessell and W. Riege. (In German.) Published by Giesserei-Verlag G. m. b. H., Düsseldorf. 152 pp.; price D.M.15.

This book is the second volume of a comprehensive work dealing with materials flow in the foundry. The first volume dealt with theoretical aspects of material flow and created such interest that the *Verein Deutscher Giessereifachleute* commissioned the second volume. This, which was produced in collaboration with Rationalisierungsgemeinschaft Transport R.K.W. is of a more practical character, and is a very full and systematic review of the various means of handling applicable to the foundry industry.

The authors have dealt with each aspect of the subject in a very detailed and logical manner and the text is generously illustrated by some 750 line drawings and photographs. The opening chapters deal with the basic principles of material flow. Numerous examples covering a wide range are given to emphasize the importance of reducing handling costs by the correct allocation and best use of floor space, and by the use of the best equipment placed in the most suitable arrangement.

Consideration is then given to more specific aspects of foundry production and individual chapters deal with handling and flow organization in the cupola stockyard, and in the fettling and coreshop. Extensive treatment is given to the installation of moulding machines, mechanized plants, sand preparation and sand conveying. Each section is considered in minute detail, the various possibilities for each idea being depicted by schematic line drawings, whilst case studies of actual installations are supported by photographs.

Some of the subject matter is in a sense elementary, but the logical systematic approach is inescapable and for this alone the book is of considerable value. It is probably the first time that the handling problems connected with the foundry industry have received such a complete and detailed review. It should be invaluable to production engineer and plant designer alike and cannot help but provide a fund of ideas for further developments. The line drawings are excellently done and enable the reader to follow most of the argument without extensive translation. However, the actual relation between text and drawing could be improved by numbering the illustrations in a clearer and more definite manner.

Although probably beyond the scope of the authors' intentions, avoidance of any dimensions or the "quantity capabilities" of the equipment mentioned is perhaps a little disappointing. Some of the more important layouts could have been drawn to scale and would, in this way, have captured more reality and greater usefulness. On page 39, the suggestion that storage bunkers should not be "too long" or "too narrow" is rather feeble, and the authors might well have made their point by indicating the most useful dimensions to adopt. As a complete collection of "ways and means" of handling in the foundry, the book is outstanding and should prove an asset and a stimulus to any foundry technician.

A. A. TIMMINS.

A £10,000,000 CONTRACT for the supply of a 200 mw reactor to Società Italiana Meridionale Energia Atomica has been signed by the Atomic Power Plant Company, Limited, Knutsford (Ches). The reactor is for a power station at Latina, about 40 miles south of Rome, and is expected to be completed by mid-1962.

Company News

Murex, Limited

Relaxations of credit restrictions may facilitate the financing of the capital programme by bank advances with the result that the proposal for the issue of permanent capital may be deferred for the present, states Sir Arthur Smout, chairman of Murex, Limited, metallurgists, manufacturers of carbon-free metals and alloys, etc., of Rainham (Essex). Treasury consent was obtained last December, and is valid until December 12, 1958, for the proposal to raise an amount not exceeding £1,300,000 by the issue of unsecured loan stock, and to bank borrowings not exceeding £500,000.

There has been some modification of the programme and certain projects have been deferred and present indications are that the programme will be extended beyond the period previously anticipated. The long-term prospects are satisfactory and the group's position is one of "considerable strength" with net current assets of nearly £4,000,000.

Defence programme cuts aggravated the effects of the gradual recession in the ferrous and non-ferrous industries and persistent weakness of the wolfram market again affected trading results. Group profits, before tax, contracted to £723,220 (£798,246) and the dividend is cut to 17½ (20) per cent. Despite the difficulties of the past year, states Sir Arthur, the substantial profit made is in a great measure due to the strength derived from diversity of activities.

A. & J. MAIN & COMPANY, LIMITED, structural engineers, etc., of Glasgow—It is proposed to capitalize £129,646 by issuing one 6½ per cent. preference share for every two ordinary held. The 1957 trading balance, after depreciation, etc., amounted to £193,510 (£204,031). After tax of £112,800 (£123,300) net profit is £80,710 (£80,731). The 10 per cent. dividend is maintained.

AURORA GEAR & ENGINEERING COMPANY, LIMITED—The company is paying a final dividend of 17½ per cent., making 22½ per cent. on capital increased by acquisition for the year to June 30, 1958, against 20 per cent. on the smaller capital. Consolidated net profit is £40,537 (£23,718) after tax of £35,007 (£28,133). In December, 1957, the issued capital of the Emil Machining Company, Limited, was acquired and profits from acquisition date are included in group earnings.

MANLEY & REGULUS, LIMITED, manufacturers of water fittings, hot pressings and compression joints, of Wolverhampton—The report states that the continual fall in the copper price has been accompanied by extremely keen competition, both at home and abroad, but the opening of new accounts in the dollar export field can be reported. To cut the cost of materials, the company has installed electric furnaces for the reclamation and conversion of scrap metal. Part of this plant is now operating.

C.V.A. JIGS, MOULDS & TOOLS, LIMITED—A sharp setback was experienced by the company during 1957, and there is no dividend on the ordinary, which received 3 per cent. last year. There is also no participating payment for the 6 per cent. participating preferred ordinary holders, who previously had an extra 3½ per cent. The ordinary was doubled to £1,000,000 a year ago when 500,000 £1 ordinary were allotted for cash at par to the Kearney & Trecker Corporation of US. Against consolidated sales of £3,660,694 (£3,233,037), costs, etc., absorbed £3,560,183 (£3,003,691), leaving operating profits £100,511, against £229,346. Charging interest £35,444 (£13,500), tax £70,481 (£122,994) and allowing £32,476 (£6,966) for exceptional charges, there is a net loss of £37,890 against a previous profit of £85,896.

Increases in Capital

THOMAS E. GRAY & COMPANY, LIMITED, ironmasters, etc., of Kettering, increased by £95,000, in £1 ordinary shares, beyond the registered capital of £5,000.

YORKSHIRE ENGINEERING & WELDING COMPANY (BRADFORD), LIMITED, Bradford, increased by £20,000, in £1 shares, beyond the registered capital of £12,000.

FREDK. POLLARD & COMPANY, LIMITED, engineers, etc., of Leicester, increased by £400,000, in £1 ordinary shares, beyond the registered capital of £220,000.

DARWINS, LIMITED (formerly D.S.S., Limited), alloy tool steel makers, etc., Sheffield, increased by £214,900, in £1 shares, beyond the registered capital of £100.

HUNSLET (HOLDINGS), LIMITED, locomotive manufacturers, etc., of Hunslet, Leeds, increased by £299,900, in 5s. ordinary shares, beyond the registered capital of £100.

LANCASHIRE STEEL MANUFACTURING COMPANY, LIMITED, Warrington (Lancs), increased by £15,999,900, in £1 ordinary shares, beyond the registered capital of £100.

H. S. ROWE & PARTNERS, LIMITED, engineers and machinists, etc., of Nottingham, increased by £13,000, in £1 ordinary shares, beyond the registered capital of £2,000.

FRY'S (LONDON), LIMITED, mechanical and electrical engineers, etc., of London, S.E.1, increased by £30,000, in 2s. ordinary shares, beyond the registered capital of £70,000.

NOBLE & LUND, LIMITED, machine-tool makers, etc., of Felling-on-Tyne, Gateshead, increased by £200,000, in 2s. ordinary shares, beyond the registered capital of £200,000.

WILLIAM E. DUNN, LIMITED, iron and steel merchants, etc., of Wednesbury (Staffs), increased by £100,000, in 2s. ordinary shares, beyond the registered capital of £50,000.

BALFOUR, BEATTY & COMPANY, LIMITED, contractors, engineers, etc., of London, E.C.4, increased by ££500,000, in £1 ordinary shares, beyond the registered capital of £1,000,000.

RICHARDS (LEICESTER), LIMITED, constructional engineers and ironfounders, etc., of Leicester, increased by £100,000, in 5s. shares, beyond the registered capital of £200,000.

RICHARD SUTCLIFFE, LIMITED, mining machinery manufacturers, etc., of Horbury, Wakefield (Yorks), increased by £23,000, in £1 shares, beyond the registered capital of £360,000.

TRUPAL ENGINEERING, LIMITED, Sheffield, increased by £18,000, in 8,000 ordinary and 10,000 8 per cent. cumulative preference shares of £1 each, beyond the registered capital of £2,000.

WORTHINGTON-SIMPSON, LIMITED, manufacturing engineers, etc., of Newark (Notts), increased by £1,000,000, in 10s. ordinary shares, beyond the registered capital of £1,500,000.

GENERAL IRON & STEEL COMPANY, LIMITED, Hayes (Middx), increased by £50,000, in 30,000 ordinary and 20,000 preference shares of £1 each, beyond the registered capital of £50,000.

SUPERHEATER COMPANY, LIMITED, London, S.W.1, increased by £600,000, in 1,673,800 "A" ordinary and 726,200 ordinary shares of 5s. each, beyond the registered capital of £1,000,000.

WILLIAM ELDER & SONS, LIMITED, agricultural implement makers, ironfounders, etc., of Berwick-on-Tweed, increased by £64,000, in £1 ordinary shares, beyond the registered capital of £16,000.

G. D. PETERS & COMPANY, LIMITED, railway contractors, rolling stock manufacturers, etc., of Slough (Bucks), increased by £392,500; in £1 ordinary shares, beyond the registered capital of £607,500.

POLLETT BROS., LIMITED, mechanical and general engineers, ironfounders, etc., of Burton-on-Trent, increased by £26,750, in £1 ordinary shares, beyond the registered reduced capital of £16,250.

HOPKINSONS, LIMITED, patent and safety boiler mountings and valve manufacturers, etc., of Huddersfield, increased by £700,000, in £1 ordinary shares, beyond the registered capital of £1,050,000.

A. S. LADLEY & COMPANY, LIMITED, instrument makers, ironfounders, mechanical engineers, etc., of London, E.C.4, increased by £10,000, in £1 ordinary shares, beyond the registered capital of £5,000.

ALFRED HERBERT, LIMITED, machine-tool manufacturers, etc., of Coventry, increased by £6,000,000, in 5,199,510 ordinary and 800,490 unclassified shares of £1 each, beyond the registered capital of £6,000,000.

EDWARD WILSON & SON, LIMITED, engineers and manufacturers of tanning and other machinery, etc., of Bootle, Liverpool, increased by £20,000, in £1 ordinary shares, beyond the registered capital of £25,000.

PIVOTED WINGS (HOLDINGS), LIMITED, manufacturers of tungsten carbide, etc., of Blackburn, increased by £10,000, in £1 10s. per cent. redeemable cumulative preference shares, beyond the registered capital of £6,000.

RAMPORDS, LIMITED, manufacturers of agricultural machinery and engines, etc., of Uttoxeter (Staffs), increased by £750,000, in 2,500,000 ordinary and 1,250,000 deferred ordinary shares of 4s. each, beyond the registered capital of £250,000.

SAMUEL BIRKETT, LIMITED, brass founders and finishers, metalworkers, etc., of Heckmondwike (Yorks), increased by £30,000, in 24,000 6 per cent. cumulative preference and 6,000 ordinary shares of £1 each, beyond the registered capital of £10,000.

PREMIER PRECISION, LIMITED, London, W.C.1, increased by £40,000, in £1 ordinary shares beyond the registered capital of £10,000.

News in Brief

THE INCORPORATED PLANT ENGINEERS have removed from Birmingham to 2, Grosvenor Gardens, London, S.W.1.

HALL & PICKLES, LIMITED, Ecclesfield, Sheffield, have presented an "Oliver" type forging hammer to Sheffield City Museum.

HARTLEY MALLEABLE FITTINGS COMPANY, LIMITED, has had plans approved to build a new foundry at Copley Lane, Copley, Halifax, Yorks.

AN EXHIBITION with the theme, "Clear the Air," has been organized by the Combustion Engineering Association, and it will be held at the Royal Society of Health Exhibition Hall from November 4 to 14.

AN EXTENSION, to cost £98,600, is to be built for the Glacier Metal Company's motor-bearings factory in Kilmarnock by Scottish Industrial Estates, Limited. It is expected to be in use some time next year and to provide employment for another 200 workers.

CARRON IRON COMPANY, Falkirk, have acquired Bathgate Foundry Company, Limited, the oldest foundry in the Bathgate district. Established in the 1850's it was controlled for the best part of a century by the Douglas family. It employs 45 men and is in full production.

Mr. ROBERT BRIGGS, who is now 75 years old, is the senior member of a family of nine who are or have been in the employment of James Brown & Sons, Limited, engineers, brass founders and coppersmiths, of Commercial Street, Middlesbrough. Total service of the family is now 312 years, and Mr. Briggs himself has no intention of retiring.

A VISIT TO STANTON IRONWORKS, near Derbyshire, is planned for seven supervisors of the Bahrein Petroleum Company, Limited, who are at present on a two months' tour of this country. When they visit Stanton on October 27 they will be taken on a tour of the mechanized foundry and pipe-spinning plant by Mr. F. Chamberlain, assistant training officer.

EIGHT DIESEL-ELECTRIC LOCOMOTIVES have been ordered by the East African Railways and Harbours Board from the English Electric Company, Limited. The locomotives, costing a total of £800,000, will be able to haul 700 tons at 45 m.p.h. on level tracks and at 15 m.p.h. on a gradient nearly 8,000 ft. above sea level, where the Kenya to Uganda line crosses the Rift escarpment.

AN ORDER has been placed with the English Electric Company, Limited, by the Southern Region of British Railways, for the supply of complete 600 h.p. diesel-electric equipments for four motor coaches, four driving trailer coaches, and 22 non-driving trailer coaches, which will be used to expand the south Hampshire diesel-electric services inaugurated last year. The coaches will be built at BR's Eastleigh and Ashford works.

A CONTRACT for a turbo-generator plant and electrical equipment for the new giant Yallourn Power Station, Victoria, Australia, has been awarded to Australian Electrical Industries Pty.—controlled by Associated Electrical Industries, Limited—by the State Electricity Commission of Victoria. More than £2,000,000 of the work will be carried out in the UK by Metropolitan-Vickers Electrical Company, Limited.

RANSOMES & RAPIER, LIMITED, Ipswich, has received an order for six RapieR 4 standard mobile cranes from the Cunard Steam-Ship Company, Limited. The cranes are required for shifting cargo to and from ship's side to dock sheds and for loading and unloading railway wagons and motor lorries. They will be mounted on pneumatic tyres and the drive is diesel-electric, with separate motors for each motion, enabling loads to be handled with speed and precision.

RICHARD THOMAS & BALDWINS, LIMITED, introduced into their Redbourn works on September 2, a radar-like device to avoid overhead cranes colliding when working close together. It is the first of its kind installed in Europe and sends out signals beyond the range of the human ear. When two cranes approach each other a sound reflector throws the signals back and if these are too strong a klaxon sounds a warning. The firm has been experimenting with the device for nine months.

AT THE INTERNATIONAL COMMERCIAL MOTOR EXHIBITION, Earls Court, London, September 26 to October 4, a centre of attraction to visiting transport operators, both home and overseas, will be stand No. 59, where Albion Motors, Limited, will display entirely new models. These include a "Clydesdale" 9-ton goods chassis; a "Chieftain" 7-ton goods chassis, and a "Chieftain" 7-ton long-wheelbase platform lorry; new "Claymore" 4-ton box vans, and a "Caledonian" 8-wheeled tanker.

THERE WAS AN OFFICIAL OPENING CEREMONY at Kidderminster on September 2 for the new foundry of Fry's Metal Foundries, Limited, Worcester Road. The new plant is equipped for the most modern methods of refining metals for solder, printers' type and bearing metals for the company's Midland customers. A luncheon to celebrate the opening was attended by the directors of the company with the Mayor of Kidderminster, Councillor H. G. Parker, and members of the town Council, as principal guests.

A 120-TON CASTING began the last stage of its journey from Pittsburgh to Middlesbrough last week when it was lifted from the Cunard-chartered cargo liner Eva Jeanette at Birkenhead. The casting, which was made by the United Engineering & Foundry Company, of Pittsburgh, for the South Durham Steel & Iron Company, Limited, was loaded on to a low-loader lorry to begin its 200-mile, six-day journey. (The Editor wonders why such a casting had to be made thousands of miles away when surely facilities for making it were available within a hundred.)

TEN MONTHS after the announcement of the Crosfield £5,000,000 re-building programme comes news that the foundation stone of the new chemicals building was laid on September 10. The ceremony was performed by Mr. R. E. Huffam, M.C., a director of Unilever, Limited, and a former director of Joseph Crosfield & Sons, Limited, and attended by the deputy mayor, Councillor H. G. Brandwood, and Canon J. C. Longbottom, Rector of Warrington. Dr. J. E. Taylor, chairman, and the directors of Joseph Crosfield & Sons, Limited, escorted the visitors. The new building, costing one fifth of the total investment, will be in full operation by July of next year. It will concentrate initially on the manufacture of alkaline detergents and silica gel: one of the principal raw materials will be supplied from the silicate plant which was itself working under extreme pressure until the opening of a new plant at Bow in November, 1957. The firm's principal connection with the foundry industry lies in its manufacture on a very large scale of sodium silicate used in the CO_2 Process of core and mould making.

Fuel Efficiency Exhibition

The Industrial Fuel Efficiency Exhibition will be held at Olympia, September 24-October 3, and a wide range of equipment, including recording and control instruments, will be on show. Among exhibitors whose stands will be of interest to foundrymen are the following firms and companies.

THE AMBER CHEMICAL COMPANY, LIMITED (*Stand No. 8, outer row*), include amongst their exhibits the firm's latest patented injection system for liquid-fuel additives.

SHANDON SCIENTIFIC COMPANY, LIMITED (*Stand 12, inner row, first floor*), are to exhibit the Glowring smoke-density indicator; the Fyrite range of portable combustion-testing equipment; and portable gas-detectors.

ALFRED HERBERT, LIMITED, Coventry, will exhibit their "Atritor" dryer-pulverizer *(Stand 6, Row G)* which is used for the pulverized coal firing of all types of metallurgical furnaces, boilers and rotary cement kilns.

THE LEONARD DIVISION of Walker, Crosweller & Company, Limited, will show on its stand (*No. 6*), the Unatap spray tap, and the industrial range of Leonard thermostatic mixing valves used in industrial ablution blocks.

KELVIN & HUGHES (INDUSTRIAL), LIMITED (*Stand A1, National Hall*), are exhibiting:—Automatic, and steam-pressure, boiler-control equipment; instrumentation for gas analysis and smoke detection, and various temperature-control equipment.

THE JOHN THOMPSON GROUP (*Stand C3, ground floor, National Hall*), are exhibiting a new "Multipac" package boiler; the Beacon industrial space-heater; "Triumph" chain-grate stoker (with vibratory ash extraction); Owl vibratory conveyors and elevators; water-treatment plant and pipework systems.

CAMBRIDGE INSTRUMENT COMPANY, LIMITED (*Stand 6B*), the range of fuel-efficiency instruments on show will include indicators, recorders, oxygen and CO_2 meters, thermometers, pyrometers and draught indicators, and a model of a boiler instrument panel will demonstrate the control of oil firing and the provision made for smoke-density assessment.

MORGAN CRUCIBLE COMPANY, LIMITED, are stressing on *Stand No. 8, centre row, first floor, National Hall* the potentialities of four grades of Tri-Mor refractories. These are either mouldable or castable and formulated for incorporating resistance to high temperature, high strength and insulation in the castable form and high temperature in the mouldable condition.

THE BRITISH ROTOTHERM COMPANY, LIMITED, Merton Abbey, London, S.W.19, will be exhibiting *(Stand 31, Outer Row, First Floor)* a comprehensive range of dial thermometers, recorders and controllers, including Bimetal instruments, mercury-in-steel thermometers, vapour pressure thermometers, mercury-in-steel temperature recorders and many other similar instruments.

NEWTON CHAMBERS & COMPANY, LIMITED, Thorncliffe, near Sheffield, will exhibit the Redfyre "Emma" boiler *(Stand 5, Row B)*—a coke-fired boiler—among the many heating appliances for industrial installation in their display. The boiler, which was introduced to this country earlier this year, has been tested on the Continent for several years (where it is made by Bronswerk N.V. of Holland), and has been approved by the British Gas Council.

GAS COUNCIL (*Stand No. 5, row H*), "Twice the speed and half the cost," is the slogan and one of the underlying themes of this stand. A large animated panel used in relation to tank heating will contrast efficient and inefficient methods of insulation, lagging and heating generally. There will also be four large transparencies which will show industrial installations where gas is used on a large scale. Attention will be drawn to the free technical advisory service provided by the Council and the 12 area Boards.

WALKER, CROSWELLER & COMPANY, LIMITED, Cheltenham, will exhibit and demonstrate their "Arkon" instruments and "Leonard" thermostatic mixing valves. The main theme of the Arkon display is the use of remote reading instruments for gas and air flow, pressure, vacuum and holder height. On the Leonard side, the display consists of thermostatic mixing valves for steam and water and for hot and cold water. Applications of Leonard valves in industrial process and ablution work will be shown.

THE ELECTRICAL DEVELOPMENT ASSOCIATION *(Stand No. 6)* will demonstrate industrial applications of electricity including a high-sensitivity thickness gauge, an electronic smoke-density meter for indicating when a factory chimney is emitting black smoke and in danger of breaking the law, a battery electric truck for works use, an electrically-lighted bottle inspection device, a layout illustrating induction heating and quenching being carried out in the production line, and an example of a crucible furnace for process heating.

HONEYWELL CONTROLS, LIMITED, will display controls for all stages in the production and distribution of heat. Boiler and burner controls will include an indicating furnace-pressure controller, a multiple point electronic temperature recorder, an electronic temperature indicator, and non-indicating temperature and pressure controllers. The latest electronic controls for combustion programme and safety applications will also be displayed. Space-heating control systems will show how the delivery of heat can be controlled—and with maximum economy. System components displayed will include line and low-voltage thermostats, electronic control panels, and associated room, insertion, and outdoor thermostats.

KEITH BLACKMAN, LIMITED *(Stand No. G.2)* will exhibit the following plant:—(1) two high-pressure blowers for supplying air blast for combustion to oil- and gas-fired furnaces; (2) a high-temperature Bifurcated-type axial fan for recirculating hot air or other gases; (3) a steam-heated unit heater for space-heating purposes in factories, workshops and public buildings; (4) a selection of industrial gas apparatus; (5) a working model of the Keith Blackman-Broman Ekstrom shot-cleaning system; (6) a model of the "Cupodel" hot-blast cupola plant; (7) a 10-in. induced draught- and grit-arresting fan; (8) a type AR aerofoil section, backward-bladed impeller used for induced draught; and (9) a model of a PD-KB multitubular dust-collector.

GEORGE CLARK & NORTH EASTERN MARINE (SUNDERLAND), LIMITED—Mr. Harry Kay, personal assistant to Mr. W. R. Jones, managing director, has been appointed a director of the company.

Personal

Mr. W. H. GLASS, O.B.E., who has been a director of Thermotank, Limited, the air-conditioning engineers, Helen Street, Glasgow, for the past 25 years, has retired from the board of the company.

Mr. HARRY HASLAM, a foreman at F. Parramore & Sons, Limited, ironfounders, Chapeltown, Sheffield, won the Ernest-Parramore trophy at the firm's annual horticultural show for the seventh successive year.

Mr. J. T. W. DEWAR, joint managing director of Firth-Vickers Stainless Steels, Limited, has been appointed managing director following Mr. C. E. HOLMSTROM'S retirement as joint managing director. Mr. Holmstrom has been appointed a non-executive director.

Mr. K. R. TURNER, who was for some years sales manager of Bayliss, Jones & Bayliss, Limited, Wolverhampton, has relinquished that position and taken up an executive appointment with the newly formed Guest, Keen & Nettlefolds Group Export Services Organization at Shell Mex House, London, W.C.2.

Mr. H. HOLDSWORTH, of Ash Brothers, Johannesburg, South Africa, is on a business trip to this country. Mr. Holdsworth is a past-president of the South African branch of the Institute of British Foundrymen. Contact with him can be made through the Polygram Casting Company, Limited, Power Road, Chiswick, London, W.4.

Remington Rand, Limited, announce that Mr. G. McLEAN, that company's secretary and a director, is relinquishing his position to take up a post with the American parent organization, the Sperry Rand Corporation. Mr. J. S. CHALMERS, the company's chief accountant, has been appointed secretary and controller of the company.

Dr. R. V. HUGHES has been appointed to Ruston & Hornsby's new research centre. He will be responsible for the general administration of the centre and for the diesel-engine technical development programme. Dr. Hughes was previously with the English Electric Company, Limited, as chief projects engineer, diesel-engine division.

Sixteen-year-old JEAN BARRACLOUGH has become the first Bradford girl to seek a skilled engineering career by joining the apprentice school of Hepworth and Grandage, Limited, piston-ring manufacturers. She secured her General Certificate in five subjects including mathematics, physics and chemistry at the local grammar school.

Edgar Allen & Company, Limited, announce the following appointments in their engineering department: Mr. J. HIGGINBOTHAM as deputy general manager; Mr. J. D. STUDHOLME as assistant general manager; Mr. A. BRUNTON as commercial manager; Mr. A. WALLIS as chief draughtsman (production); Mr. J. D. LEE as chief draughtsman (development); and Mr. S. CARTER as chief estimator.

Mr. ROBERT NELSON has retired after 21 years' service as principal of Cowdenbeath (Fife) Technical College. Seventy guests—staff, pupils and friends—attended a dinner in his honour in Dunfermline, when he was presented with an inscribed gold watch on behalf of the staff and pupils. Mr. Nelson went to the Fife Mining School in 1937 as principal after more than 20 years' service as a technical teacher in the south of England.

Mr. H. M. HUDSON will be in charge of the new depot of British Insulated Callender's Cables, Limited, to be opened at Oakcroft Road, Chessington, Surrey (telephone: Lower Hook 2323), on September 15. Mr. Hudson has served BICC and its predecessors for a quarter of a century. He joined Callender's Cable & Construction Company, Limited, in January, 1933, and was appointed London area representative in 1934.

Mr. BIREN MUKERJEE, a senior director of Marshall Sons & Company (India), Limited, a subsidiary of the Gainsborough firm of the same name, has returned to Gainsborough with his 19-year-old son, Mr. BIMAL MUKERJEE, who is to undergo engineering training there, as his father did as a premium apprentice 25 years ago. Mr. Mukerjee spent three years in Gainsborough from 1930 to 1933 and then completed his training at Loughborough Technical College before returning to India.

Captain FREDERICK THOMAS BOSWELL, inspector of naval ordnance at the Ordnance Inspection Establishment, Janson Street, Sheffield, since 1950, has retired. He went to Sheffield as an assistant inspector in 1936, and was later appointed deputy inspector. He is succeeded by Captain I. G. GIBSON, O.B.E., R.N. At a presentation made to Captain Boswell on September 5, guests of honour were Rear Admiral S. A. Pears, C.B.E., former president of the Ordnance Board, and Captain R. W. Armytage, chief inspector of naval ordnance, Department of Weapons, at Bath.

Mr. JAMES HUGH NEILL, deputy chairman and joint managing director of James Neill & Company (Sheffield), Limited, will be installed as the new Master Cutler on October 7. Mr. Neill, who is 37, has been president of the British Hacksaw Makers' Association since 1956, and is a member of the Grand Council of the Federation of British Industries, the National Federation of Engineers' Tool Manufacturers, the Joint Council of the Sheffield Lighter Trades Employers' Association and the Executive Council of the Federation of British Hand Tool Manufacturers. His father, Colonel Sir Frederick Neill, was Master Cutler in 1937.

Obituary

Mr. BERTRAM MOORE, chief cashier of William Doxford & Sons (Shipbuilders), Limited, Sunderland, has died at the age of 61. He had served on the company's staff for 47 years.

Mr. HEBDEN HUMPHREYS, works ambulance officer at Newton Chambers & Company, Limited, ironfounders and engineers, Chapeltown, Sheffield, for the past 19 years, has died at the age of 63.

The death has occurred of Mr. A. W. DAVIDGE, at the age of 47. Mr. Davidge had been the southern representative of J. W. Jackman & Company, Limited, for the last five years. He was a competent and friendly man who will be greatly missed in foundry circles.

Mr. M. H. CURNOW, who died on August 29 at the age of 72, was amongst the three senior members of the Institute of British Foundrymen, having joined in 1906 as a founder member of the Birmingham branch. Mr. Curnow was a Cornishman and served his time with Sara & Burgess, Limited, of Penryn, Falmouth, leaving in 1911 to work at Belliss & Morcom, Limited, and later at Campbells Foundry, Bristol. He joined Rudge Littley, Limited, West Bromwich, in 1919, as foundry foreman and became a director in 1943, he retired in 1954 and returned to Cornwall. During the period of 35 years at Rudge Littley, Limited, he became well known in foundry circles, particularly in the Midlands, as a first-class foundryman.

Raw Material Markets

Iron and Steel

Trading conditions among the ironfoundries show little variation from the position which has obtained for some time past. Although some establishments are much more favourably employed than others, they could all undertake more work than they have on hand at present; in some instances plants are working much below capacity. The scarcity of orders for light castings still exists. The light foundries have been producing much below capacity for some considerable time, this position also being applicable, but to somewhat lesser extent, to most of the textile and a number of the jobbing foundries. Hopes continue to be entertained that business will improve shortly.

Foundries producing high-duty castings have fared, and continue to fare, much better than the other foundries. Those units supplying chiefly to the motor-vehicle trade have had a long run of capacity outputs and, although there has been some decline in demands for castings recently, present orders are on quite a good basis. The motor-car industry is very optimistic of the future and, judging by reports, an increased demand for castings is expected from them shortly. While the machine-tool industry is not so busy, it expects conditions to improve. The engineering and speciality foundries are also hoping for continued business, at least on present levels, from the many other trades to which they supply castings, including the heavy engineering, power and electrical equipment, and agricultural implement trades, etc.

There has been a slight improvement in the demand for small bars, but a much larger tonnage could be undertaken by the re-rollers to keep plants fully occupied. The increased business has, however, helped in fixing up their rolling programmes for the working shifts, but most of them continue on a shortened working week. There is little improvement in the call for light sections, strip, etc. Plentiful supplies of steel semis are available from home steelworks and a much larger demand could be supplied without difficulty. The increased call for small bars has resulted in a larger usage of billets and, where suitable stocks at the re-rollers have not been available, some increase in demand has been made on the steelworks.

Non-ferrous Metals

Two United Nations exploratory meetings, one on copper and the other on lead and zinc, are being held in London this week. The three-day meeting on copper ended yesterday (Wednesday) and the meeting on lead and zinc continues until Saturday. The meetings are being held at the invitation of the UK Government. They have been convened by the Secretary-General of the United Nations on the basis of recommendations by the Interim Co-ordinating Committee for International Commodity Arrangements to which the Economic and Social Council has given, among other things, the function of convening intergovernmental study groups. Metals have represented the weakest markets for primary commodities during the period since the general level of commodity prices began to decline last year, and the sharp fall in prices of copper, lead, and zinc have had serious repercussions on all countries producing them, particularly the underdeveloped countries. The meetings will be only exploratory. If it is decided that further intergovernmental considerations or action is desirable, then the question will arise as to the form which it should take. It could, for example, consist of consultations or studies arranged from time to time as required, or, if further action is called for on a more or less continuous basis, the usual method has been to establish an intergovernmental study group.

Tin, after its short sharp flurry last week, when the price of both cash and three months' metal moved up smartly on the UK Government's move to check the increasing flow of Russian tin on the market, has once more settled back on the "floor." The UK Government's decision to limit the import of tin from Russia of 2,090 tons a quarter has been welcomed by other members of the International Tin Council and particularly Malaya. *Prima facie* it would appear that this move has gone some distance towards preventing Russian supplies from undermining the tin price. But there is, too, the reported American view to consider, which is that Russian tin will enter world markets by other and less well-known methods and markets. The market's behaviour would appear to support the latter view. In fact, there seems every chance that Japan will switch her purchases of tin from Malaya—which average about 7,000 tons annually—to Russia, providing the price is right and also if a satisfactory barter arrangement can be effected.

In any event, the UK Government has done the right thing, even if a little belatedly, and when supported by similar action it will have a beneficial effect on the market. In the long run, of course, the trend of prices must depend on supply and demand, and if consumers enter the market again in any strength the market would show a rapid improvement. Meanwhile, stocks in the UK are showing a gentle decline although the buffer stock manager is having to support the market. In the United States buying continues weak and the price is drifting down towards 95 cents a pound.

Copper is holding its own. The overall position is a bit confused, but, all points considered, it seems likely that the price will be maintained at around its present level until buying picks up again as is anticipated. At the moment the American position needs watching. In the first place it will be interesting to see what, if anything, President Eisenhower will do about taking action on the Tariff Commission's report. Secondly, US stocks —though well held—are high. Thirdly, Phelps-Dodge has now joined Kennecott in raising its production by extending its working week from four to five days. A four-day week has been in force since June 1 last, and the latest move means that the company's production will be increased by about 3,500 tons a month. On the other hand, the US custom smelters raised their price by ¼ cent to 26¼ cents a pound. It was said that this was due to improved demand, but there are those who believe the price rise stemmed from the trend of prices in London allied with the seemingly bullish action of Kennecott and Phelps-Dodge in raising their rates of production. The US producers' price is unchanged at 26¼ cents a pound.

The general council of the Northern Rhodesia Mineworkers' Union met at Kitwe last night (Wednesday) to consider the result of the union ballot to decide whether white Copperbelt miners would strike. A union spokesman said that, until the meeting, members would continue to refuse to do disputed jobs.

Lead continues to be an unhappy—even if a little firmer—market on both sides of the Atlantic. Overall demand for the metal throughout the world is not good, stocks are high, and consumers remain reluctant to enter the market in strength. Much will depend on what is done in respect of increased duties. The US quotation is still called 10¾ cents a pound.

Zinc is quietly dull, although the outlook—if US steel orders eventuate on the scale anticipated—is better than for some time. In the US the price is 10 cents a pound.

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September 10, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.: N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per* cent. Si, £44 0s. 0d. to £44 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £62 0s. 0d. to £62 10s. 0d., scale 17s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 6s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 9s. 6d. per b. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £83 10s. 0d. to £87 0s. 0d., basis 60 per cent. Cr, scale 30s. 0d. to 30s. 6d., per unit; over 6 per cent. C, £79 10s. 0d. to £85 0s. 0d., basis 60 per cent. Cr, scale 30s. 6d. per unit; 2 per cent. C,* 2s. 0d. per lb. Cr; 1 per cent. C,* 2s. 0½d. per lb. Cr; 0.15 per cent. C,* 2s. 1½d. per lb. Cr; 0.10 per cent. C,* 2s. 1¾d. per lb. Cr; 0.06 per cent. C,* 2s. 2d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £265 0s. 0d.; 96/98 per cent., £295 0s. 0d.

Ferro-columbium.—65/72 per cent., Nb + Ta, 19s. 9d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £78 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanized corrugated sheets, 24g., £66 16s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £207 0s. 0d. to £207 5s. 0d.; three months, £207 0s. 0d. to £207 5s. 0d.; settlement, £207 5s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 11⅞d. per lb.; rods, 220s. 0d. per cwt. basis; 20 s.w.g., 253s. 3d. per cwt.

Tin.—Cash, £730 0s. 0d. to £730 10s. 0d.; three months, £727 10s. 0d. to £728 0s. 0d.; settlement, £730 10s. 0d.

Lead (Refined Pig).—First half September, £70 15s. 0d. to £71 0s. 0d.; first half December, £72 0s. 0d. to £72 2s. 6d.

Zinc.—First half September, £64 15s 0d. to £65 5s. 0d.; first half December, £65 5s. 0d. to £65 7s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £98 10s. 0d.; rolled zinc (boiler plates), all English destinations, £96 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £85 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 7¼d. per lb.; sheets to 10 w.g., 174s. 3d. per cwt.; wire, 2s. 5d.; rolled metal, 174s. 3d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £121; B6 (85/15), —; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £169; HTB2 (38 tons), —; HTB5 (48 tons),—.

Gunmetal.—BS1400, LG2 (85/5/5/5), £169; LG3 (86/7/5/2), £177; G1 (88/10/2/½), £235; (88/10/2/1), £229.

Phosphor Bronze.—BS1400, PB1 (AID released), — per ton.

Phosphor Bronze Strip, etc.—Strip, 256s. 6d. per cwt.; wire, 3s. 9½d. per lb.; rods, 3s. 0¾d.; tubes, 3s. 0¾d.; chill cast bars: solids 3s. 0¼d.; cored 3s. 1¼d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 7d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 11¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 10¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £79 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, —; AB2, £230.

* Average 68-70 per cent.

Forthcoming Events

SEPTEMBER 16

Incorporated Plant Engineers

Birmingham branch:—"Clean Air," by R. Williams, 7.30 p.m., at the Hotel Leofric, Coventry.

Society of Chemical Industry

"Factors Affecting the Performance of Condenser and Heat-exchanger Tubes," by P. T. Gilbert, PH.D., F.R.I.C., F.I.M., 7 p.m., at the King's Head Hotel, Newport, Monmouth. (Joint meeting with the South Wales section of the Society of Chemical Industry and the Cardiff section of the Royal Institute of Chemistry.)

SEPTEMBER 17

Association of Bronze & Brass Founders

Yorkshire area:—Meeting at Royal Victoria Hotel, Sheffield, commencing at 11.45 a.m., followed by luncheon at 1 p.m. In the afternoon a visit to the foundry of Millspaugh, Limited, has been arranged.

Incorporated Plant Engineers

Kent branch:—"General Outline of Some of the Problems Involved in Space Travel," 7 p.m., at the King's Head Hotel, High Street, Rochester.

SEPTEMBER 18

Incorporated Plant Engineers

Blackburn branch:—"Recent Advances towards Thermo-nuclear Power (Sceptre and Zeta)," by J. E. Read, B.SC., 7.30 p.m., at the White Bull Hotel. (Joint meeting with the Institute of Fuel.)

SEPTEMBER 20

Institute of British Foundrymen

Stoke-on-Trent section:—Works visit to the De Havilland Aircraft Company, Limited, Chester Works.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

INDIA, September 17—Requirements of the National Coal Development Corporation (Private), Limited, include grooved trolley wire, friction rollers, cast-steel wheels, roller bearings and cast-iron brackets for mine-car wheels. (ESB/20199/58.)

SOUTH AFRICA, September 18—Hydraulic press. (ESB/21821/58.)

CANADA, September 25—Universal testing machine. (ESB/21669/58.)

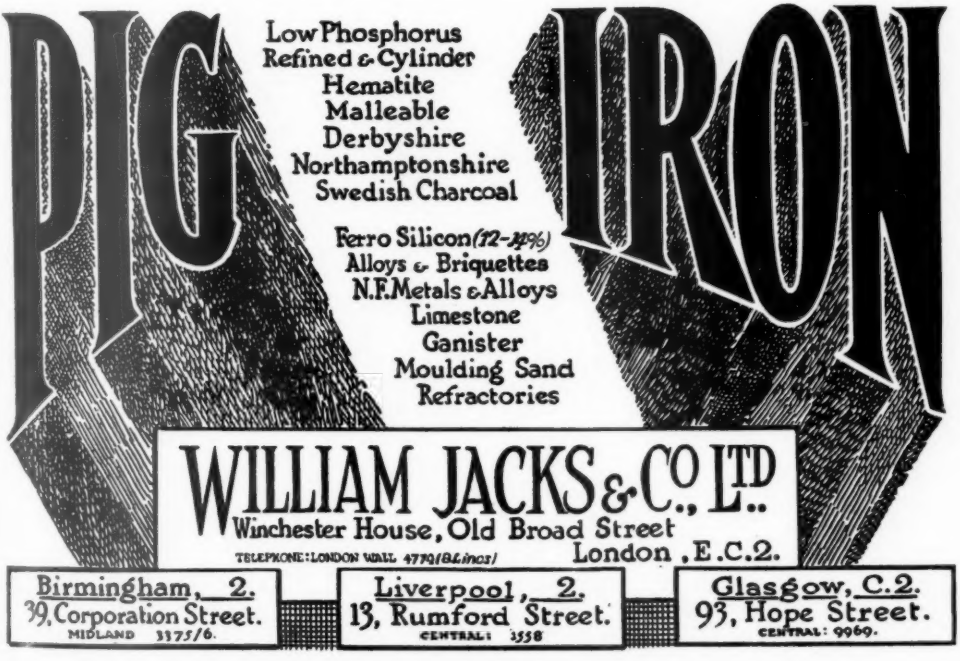
NIGERIA—Texas Petroleum Company, P.O. Box 166, Lagos, have informed the United Kingdom Trade Commissioner at Lagos that they are anxious to get in touch with United Kingdom manufacturers of hand-operated semi-rotary petrol-dispensing pumps. These are used for dispensing petrol direct from 50-gall. drums. They wish to make it clear that they are only interested in the complete dispensing pump which includes measuring gauges, etc. (ESB/21409/58.)

EAST AFRICA, October 17—The Municipal Council of Dar es Salaam invite tenders for the supply and installation in Dar es Salaam of a weighbridge with a capacity of approximately 27 tons, a platform size of not less than 20 by 8 ft., and incorporating an automatic recording dial indicator. (ESB/21745/58.)

SOUTH AFRICA, September 19—Rollover and draw machines. (ESB/21187/58.)

USA—Laurens Bros. Export Corporation, 2780, Highland Avenue, Cincinnati 12, Ohio, have advised the British Consulate-General at Cleveland that they wish to receive prices, catalogues and descriptive literature from United Kingdom manufactures of die-sinking and injection-moulding machines. (ESB/21797/58.)

KOREA, September 20—Requirements include malleable-iron pipe fittings; elbows 90 deg.; tees; unions; flanges; bushings; 30 expansion joints; 12 strainers; 70 traps; cast-iron radiators; cast-iron boiler; 225 valves, globe, bronze or brass; 10 valves, reducing steam, bronze and brass; 64 valves, globe, cast iron; 8 valves, reducing steam, cast-iron body. (ESB/21780/58/ICA.)



Imports and Exports of Iron and Steel in July

The following tables, based on Board of Trade returns, gives figures of imports and exports of iron and steel in July. Totals for the first seven months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended July 31.	Seven months ended July 31.	
	1958.	1957.	1958.
	Tons.	Tons.	Tons.
Channel Islands	549	2,216	2,686
Cyprus	685	7,793	4,155
Sierra Leone	1,584	8,080	8,279
Ghana	1,162	14,107	8,209
Nigeria	9,609	34,039	39,041
Union of South Africa	6,681	65,390	63,515
Rhodesia and Nyasaland	1,078	40,471	23,021
Tanganyika	1,020	13,575	7,388
Kenya	2,688	30,607	26,997
Uganda	346	2,467	1,851
Mauritius	234	2,119	2,288
Aden	376	2,745	2,036
Bahrein, Qatar, and Trucial States	714	8,644	5,453
Kuwait	3,173	19,434	25,961
India	10,326	162,493	80,057
Pakistan	2,609	39,026	40,424
Singapore	3,814	24,755	21,751
Malaya	1,132	22,577	9,476
Ceylon	1,182	17,904	17,480
British North Borneo	170	2,361	1,404
Hongkong	6,482	56,300	33,368
Australia	11,353	123,394	56,646
New Zealand	18,494	121,226	109,256
Canada	21,691	173,726	118,690
Jamaica	1,880	14,052	11,503
Trinidad	4,742	27,139	31,777
British Guiana	881	4,196	4,732
Other Commonwealth countries	4,557	18,496	20,757
Eire	4,434	25,635	30,672
Finland	4,318	52,531	28,525
Sweden	8,294	65,644	77,800
Norway	4,210	68,905	54,225
Denmark	7,643	66,044	55,011
Western Germany	3,217	5,627	19,134
Netherlands	6,696	67,036	49,687
Belgium	1,104	24,155	14,120
France	295	12,037	1,756
Switzerland	1,041	11,303	6,732
Portugal	919	12,247	8,756
Spain	5,190	26,216	32,352
Italy	3,958	31,496	27,184
Austria	926	2,946	6,932
Yugoslavia	182	6,052	2,522
Greece	1,213	6,140	8,697
Turkey	487	3,620	3,286
Netherlands Antilles	358	2,281	1,247
Portuguese East Africa	233	2,848	1,534
Egypt	512	469	10,478
Sudan	3,881	11,049	24,231
Lebanon	280	4,697	8,350
Israel	703	2,966	5,155
Saudi Arabia	61	2,748	3,279
Iraq	2,091	27,137	21,443
Iran	3,715	39,472	21,765
Burma	385	14,501	5,933
Thailand	589	4,865	3,913
Indonesia	59	5,362	1,301
Philippine Republic	470	1,757	2,134
USA	6,397	31,317	46,323
Cuba	600	5,706	3,447
Colombia	455	3,890	4,647
Venezuela	3,058	68,277	50,103
Ecuador	84	1,652	1,914
Peru	1,072	6,726	7,098
Uruguay	38	4,746	700
Argentina	8,014	47,570	85,047
Other foreign countries	13,643	85,828	77,388
TOTAL	220,037	1,922,820	1,593,022

Total Imports of Iron and Steel

From	Month ended July 31.	Seven months ended July 31.	
	1958.	1957.	1958.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	593	2,656	4,262
Canada	1,850	30,434	11,978
Other Commonwealth countries and Eire	2,986	14,901	14,915
Soviet Union	10,040	163,938	107,521
Sweden	2,489	18,575	20,534
Norway	4,172	69,015	45,593
Poland	68	7,156	83
Western Germany	4,392	66,999	49,116
Netherlands	13,737	32,078	88,783
Belgium	14,995	95,610	58,471
Luxembourg	529	17,872	4,815
France	683	39,586	13,532
Italy	1,016	2,605	3,843
Austria	590	48,563	3,022
Japan	649	8,743	2,232
USA	1,945	153,749	113,785
Other foreign countries	335	16,057	3,010
TOTAL	61,069	788,537	545,495
Iron and steel scrap and waste, fit only for the recovery of metal	3,049	491,907	55,469

Exports of Iron and Steel, by Products

Product.	Month ended July 31,	Seven months ended July 31,	
	1958.	1957.	1958.
	Tons.	Tons.	Tons.
Pig-iron	5,330	75,464	68,734
Ferro-columbium (niobium)	—	70	19
Ferro-tungsten	44	365	394
Other ferro-alloys	278	1,921	2,014
Ingots, blooms, billets, slabs, sheets, and tinplate bars	60	780	7,154
Iron bars, rods, angles, shapes, and sections	85	1,158	1,002
Steel bars, rods, angles, sections, and shapes	23,742	322,867	205,931
Iron plates and sheets	2	95	1,802
Universal plates	193	4,116	3,131
Steel plates, ¼ in. and under ⅜ in.	888	7,859	4,587
Ditto, ⅜ in. and over	10,490	115,670	111,984
Blacksheets and blackplate	23,410	198,887	174,755
Hoop and strip	5,214	58,604	35,175
Tinplate	34,601	249,080	213,775
Decorated tinplate	303	3,301	1,662
Galvanized sheets	6,964	122,746	42,847
Other (incl. tinned sheets, terne-plate, and ternesheets)	994	12,459	7,908
Railway and tramway construction material	29,135	161,815	152,612
Wire rods of steel (incl. alloy steel)*	3,393	35,270	21,936
Wire	8,312	65,899	61,441
Tubes, pipes, and fittings	65,303	476,770	463,171
Iron castings	220	1,107	4,396
Steel castings	260	1,595	1,721
Forgings	816	4,922	4,871
TOTAL	220,037	1,922,820	1,593,022

* The figures for 1958 are not completely comparable with those for previous years.

A NUMBER OF WORKERS will lose their jobs at the Blackness foundry of Urquhart Lindsay & Robertson Orchar, Limited, Dundee, at the end of this month. Because of trade difficulties the foundry is to be closed down and its equipment transferred to Leeds.

B.T.R. INDUSTRIES, LIMITED, thermoplastics and rubber manufacturers, is building a large factory at Farington, near Preston (Lancs). Principal products are to be tank and pipe linings, large and small roller coverings, and bearings—all mainly in rubber.